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USSR Report

CHEMISTRY

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ADSORPTION

UDC 541.183+546.831'18

ION EXCHANGE PROPERTIES OF Zr(IV) TRIMETAPHOSPHIMATE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 1, Jan 85
(manuscript received 29 Nov 83) pp 29-34

BORTUN, A.I., KVASHENKO, A.P., BELYAKOV, V.N. and STRELKO, V.V., Institute
of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] The ion exchange properties of zirconium trimetaphosphimate were studied to clarify the effects of solution temperature and pH and heat treatment temperature of the sorbent on the adsorption of certain mono and divalent cations. Infra-red spectra show that raising the solution temperature to 50° has little or no effect on ion sorption. Above 50°, ion sorption increases, especially at pH > 2, where the selectivity of zirconium trimetaphosphimate towards transition metal ions drops. This is apparently due to partial disruption of structure at the higher temperature. Exchange capacity-temperature curves show that zirconium trimetaphosphimate is a heat-resistant ionite that maintains its ion exchange properties to 350-400°. Figures 4; references 15: 10 Russian, 5 Western.
[164-12765]

UDC 541.183

ADSORPTION OF CARBON DIOXIDE FROM LIQUID NITROGEN OVER ASMK SILICA GEL

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85 (manuscript received 21 Mar 83) pp 132-134

BOGUSLAVSKIY, S.V., ZAYTSEV, S. V., MOROZOV, V. S., PRONSKAYA, A. Ya. and YEGRISHCHINA, N. A.

[Abstract] Equilibrium concentrations of carbon dioxide in liquid nitrogen were studied as a function of temperature (77.4-100 K) at a constant pressure of 3.9 MPA and a wide range of adsorption values (0.82 to 2.37 mmole/g) over silica gel ASMK. The maximum values of CO₂ adsorption from saturated liquid nitrogen solutions increased with temperature elevation. With the

increased adsorption value of CO_2 , its concentration in the phase above the adsorbent was limited to a certain level and further preadsorption on silica gel did not increase its concentration beyond this point. Figure 1; references 3: 2 Russian, 1 Western.
[175-7813]

UDC 621.039.3:546.11.02

ISOTOPE AND PHASE EQUILIBRIA OF HYDROGEN ON NaA ZEOLITE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85 (manuscript received 8 Aug 83) pp 52-57

POLEVOY, A.S., ALEKSEYEV, I.A., TRENIN, V.D. and YUDIN, I.P., Leningrad Institute of Nuclear Physics imeni B.P. Konstantinov, USSR Academy of Sciences; Moscow Chemical-Technologic Institute imeni D. I. Mendeleyev

[Abstract] Data on radiation resistance of zeolites is useful in designing continuous counter-circuit adsorption processes for concentrating tritium, working with radioactive gases in adsorption pumps and the possibility of using these sorbents as storage-matrices for radioactive waste. In the present work a study was made of the isotope and phase equilibria of hydrogen sorption on NaA zeolite and the effects of ionizing radiation on the mechanical and sorption properties of the latter. The experimental data on hydrogen isotope sorption equilibria agreed well with a previously presented formula. The volume of irradiated and heat treated zeolite is not a function of saturation dosage or its strength (0-4170 R/sec). Hydrogen sorption, before or after irradiation, takes place by a pore-filling mechanism. Ionizing radiation to 11,000 Mrad has no effect on the mechanical strength of the zeolite. This, and other data presented, make it possible to conclude that NaA zeolite may be used in adsorption processes to concentrate tritium, as working components in adsorption pumps for radioactive gases and as storage-matrices for radioactive waste. Figures 4; references 7: 5 Russian, 2 Western.
[176-12765]

ANALYTICAL CHEMISTRY

BOOK: USE OF MASS SPECTROMETRY IN INORGANIC CHEMISTRY

Moscow MASS-SPEKTROMETRIYA V NEORGANICHESKOY KHIMII (NOVOYE V ZHIZNI, NAUKE, TEKHNIKE) in Russian No 11, Nov 84, pp 2-7, 61-63

[Annotation, introduction and table of contents from book by L.N. Gorokhov, doctor of chemical sciences and professor, "Mass-Spectrometry in Inorganic Chemistry", Izdatel'stvo Nauka, 26,820 copies, 64 pages]

[Text] ANNOTATION

The book presents the results of the use of mass-spectrometry in the study of inorganic substances at high temperatures under which processes with gaseous phases begin to play an important role. Examples are included that illustrate various processes taking place during the evaporation of inorganic substances such as dissociation, the formation of associates, disproportionation and the formation of multi-atom positive and negative ions.

This volume is intended for lectures, teachers, students at peoples' universities and all persons interested in the use of physical methods of research in solving the problems of inorganic chemistry.

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Introduction	

From the end of the 1940's to the beginning of the 1950's, the industrially developed nations of the world saw a rapid development of new branches of technology which were characterized by the use of high-temperature processes. The demands of nuclear power engineering, rocket technology, nonferrous metallurgy and semiconductor technology made it necessary to study the properties of substances under high temperatures.

It is obvious that the higher the temperature, the greater the role played by evaporation processes and gaseous phase-processes. The following are examples of some of these processes that are of great practical significance: 1) the cooling of spacecraft entering the earth's atmosphere by evaporative ablation of its protective covering, i.e., entrainment of the covering's mass by sublimization (as well as by melting and erosion); 2) the production of semiconductor materials by their precipitation from gaseous phase during transport reactions and of fine films by vacuum deposition; 3) the treatment of polymetallic sulfide ores in nonferrous metallurgy by processes of evaporation and thermal disassociation. In many cases evaporation processes play a negative role, limiting, for example, the service life of heat-resistant materials.

A new branch of chemistry, high-temperature chemistry, was formed as a result of practical needs and the innate logic of the growth of science. High-temperature chemistry uses elements of both inorganic and organic chemistry to study substances and processes under high temperatures. One of the most important areas of high-temperature chemistry is study of the vapors of inorganic systems. In many cases, study of the gaseous phase has made it possible to diagnose the state of the condensed phase itself and to determine, for example, the character of the activity of components in two-component systems.

The basic questions that must first be answered are: 1) which molecules are found in the gaseous phase; 2) what are the partial pressures of each of the component gaseous phases, i.e., what is their quantitative composition. At high temperatures, reaction speeds are great and an equilibrium of the condensed phase/gaseous phase reaction and of the gaseous phase reaction is therefore attained. Thus, when information on the qualitative and quantitative state of the system is available, it is possible to calculate the thermodynamic characteristics of the condensed phase/gaseous phase and gaseous phase reactions: to determine the enthalpy of sublimation of evaporation of the vapor components, find the enthalpy of molecule formation and calculate the energy at which chemical bonds are broken.

We can therefore assume ahead of time that in many cases the composition of inorganic substance vapor is complex. These vapors can contain both monomers as well as associated molecules and products of disassociation and disproportionation. It is therefore necessary to be able to make a detailed analysis of the vapor composition. Generally speaking, various methods can be used to study the vapor composition and measure the pressure of its components. However, the fullest information is provided by mass-spectrometry which has become one of the most important instrumental methods of high-temperature chemistry.

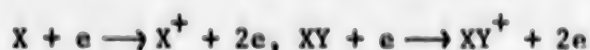
A mass-spectrometer is a device used to study different substances by determining the quantity and mass of their ions (or to be more exact, the relative mass of the ions and their charges). The set of values for ion masses and relative compositions is called the mass-spectrum. Mass-spectrometry was born in 1919. Its creator, Aston, used his new method to solve a fundamental problem of physics: study of the isotopic composition of elements and consequently determine the mass of atoms. Purely physical methods later began to be often used to solve chemistry problems. Thus, in the 1940's, mass-spectrometry began to be used to analyze mixtures of organic compounds. Later study of regularities in the mass-spectra of organic compounds made it possible to form certain conclusions about their structure and the presence of different functional groups and their positions within the given molecule. On the whole, mass-spectrometry has become a universal means of gas and vapor analysis.

The device which is examined in greater detail below consists of the following main elements: 1) sample input system; 2) ion source in which neutral atoms and molecules are changed by an ionizing agent into mostly positive ions which are then formed into an ion beam; 3) a mass-analyzer which breaks down the ion beam into its component parts according to the value of m/z , the relationship of the mass to the charge; 4) a detector that measures ion streams corresponding to various values of m/z . It should be added that all of the described events take place in a high vacuum.

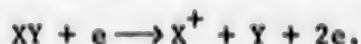
However, in order to analyze a gaseous mixture (by mass-spectrometry or other methods), the spectra of the individual compounds making up the mixture are studied first and then the sensitivity of the spectrometer to each of them is determined. This makes it possible to "decode" the mixture's spectrum and to determine its qualitative and quantitative composition.

The situation is entirely different in analysis of the composition of vapor of high-temperature systems in which the component vapors interact and form an equilibrium: the composition is therefore determined by temperature and pressure. Generally speaking, it is impossible to separate the individual components of equilibrium vapor, take their spectra and determine the sensitivity of the spectrometer to each of them. Therefore, it is necessary in this case to use certain specific analysis methods. Since the mass-spectrometer should produce a sample (of the equilibrium composition), the sample extraction should be carried out in such a way as to "freeze" its composition. This therefore brings us to the most widely-used scheme for spectrometric analysis of high-temperature equilibria, a combination of the

effusion method of vapor pressure measurement with mass-spectrometric registration of its composition. The effusion method is based on measurement of the evaporation speed of a substance flowing into a vacuum from a vessel with a small opening (effusion cell). The vapors move in a molecular flow at which the mean length of free molecule flow is much greater than the diameter of the effusion opening. At the diameters usually used (fractions of a mm), this condition is often seen if the pressure in the cell does not exceed ≈ 10 Pa ($\approx 10^{-4}$ atm.). The composition of the escaping (effusing) vapor stream is identical to the composition of the vapor in the cell. The central part of the stream dissected by a system of diaphragms enters the spectrometer ion source. In the ion source, part of the molecules (a very small part) is formed into ions by collision with electrons and it is predominantly positive ions that are formed. Ionization of atoms and molecules with the formation of positive ions



occurs if the energy of the electrons exceeds that of the ionization of the atom or molecule. If the electron energy is further raised, a process of dissociative ionization of the molecules becomes possible along with the formation of charged and neutral fragments:



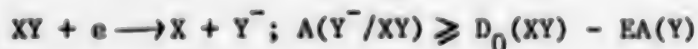
The XY^+ ion is called the molecular ion while the X^+ ion produced from the XY molecule is the fragment ion. The minimal energy necessary to form a fragment ion is known as its energy of appearance. The terms "energy of ionization" and "energy of appearance" are still not commonly used. They were recently suggested by IUPAC to replace the terms "potential of ionization" and "potential of appearance."

The value of the energy of appearance of a fragment ion can be calculated if we represent the process of ion formation as the sum of two processes: disassociation of a molecule into fragments and the ionization of one of the latter. Therefore

$$A(X^+/XY) \geq D_0(XY) + I(X).$$

Where $A(X^+/XY)$ is the energy of appearance of an X^+ ion from an XY molecule, $D_0(XY)$ is the energy of molecule dissociation into X and Y fragments and $I(X)$ is the energy of ionization of fragment X . The \geq sign was included because fragments can be excited and carry kinetic energy.

The most important process of the formation of negative ions is the dissociative capture process:



where $EA(Y)$ is the affinity for the Y electron.

The relationship of the ion stream to the energy of ionizing electrons is commonly called the curve of ionization efficiency. Simply speaking, this relationship for positive ions has the following form: starting with the threshold value of energy, i.e., the energy of ionization or the energy of appearance, the ion stream grows somewhat linearly and then goes through a gently sloping maximum (at an energy level several times exceeding the threshold value) and begins to fall gradually. In the case of the dissociative capture process, for negative ions the ion stream forms an asymmetrical bell curve, falling to zero in either direction from the maximum.

The form of the ionization efficiency curve reflects the relationship between electron energy and the cross-section of ionization, a value that makes it possible to calculate how the ion flow is formed during the ionization of gas or vapor with a density of n (n --the number of particles per unit volume) at an electron flow of i_e :

$$I = \sigma i_e n l$$

where l is the length of the electron path in the ionization region. The ions formed in the ionization region are accelerated by the electrical field, formed into an ion beam and directed into the mass-analyzer where the common beam is broken down into beams of varied values of mass to charge ratio. A magnetic analyzer is most frequently used. In this device, ions of the same energy move along the periphery of a transverse magnetic field, the radii of which depend on the ratio of mass to charge. The ion streams are measured with the help of a secondary electron-beam multiplier and electro-metric amplifiers within a range of 10^{-9} - 10^{-19} A.

Conclusions

This book is an attempt to describe the possibilities and results of the mass-spectrometric method in the study of inorganic substances. In most cases, mass-spectrometric study of inorganic substances is conducted at temperatures from a few hundred degrees to 2000-3000 K and may therefore be considered a part of high-temperature chemistry. High-temperature chemistry is a broad field and is therefore somewhat inexact. The necessity of work under high temperatures only formally reflects the specific details of high-temperature chemistry. The essence of the problems lies in the specific features of the studied processes such as evaporation, disproportionation, dissociation, the appearance of molecules with unusual atom valent states, the formation of nonstoichiometric compounds in a solid phase, etc.

As the included material has shown us, the development of high-temperature mass-spectrometry has been rather unique. In its first stages, high-temperature mass spectrometry was used to study rather simple substances at very high temperatures. The temperatures at which later studies were conducted were lower but the complexity of the studied processes increased substantially. Within the format of this book it was necessary to limit discussion to only a small part of the contributions that mass-spectrometry has made to inorganic chemistry. In particular, discussion here has been limited to examination of equilibria when comparing mass spectrometric

detection with the effusion method of determining vapor pressure. However, mass-spectrometry of inorganic substances is not limited to these bounds. There exists work in which the kinetics of evaporation processes are being studied. The behavior of substances under laser radiation is being studied and work is also being done on the equilibria at atmospheric pressures such as those found in flames, for example. Other research is also being conducted on the thermodynamics of ion-molecule equilibria at relatively low pressures, etc. It is important, however, to point out that high-temperature mass-spectrometry at low pressures has made it possible to look into diverse processes accompanying evaporation and to obtain a large amount of thermodynamic information. This information has been released in publications on chemical thermodynamics and has also been saved in computer data banks such as the IVTANTERMO data bank on the thermodynamic properties of substances at the USSR Academy of Sciences Institute of High Temperatures. In arranging thermodynamic functions and the thermodynamic characteristics of substances, we can calculate the equilibria of various processes and this is important in the most varied fields of science and technology: in the optimization of metallurgical processes, explaining the behavior of an ionized additive in a magnetic hydrodynamic generator and in calculating the conditions of transport reactions in order to produce semiconductor materials, etc.

The following are some practical examples of the use of thermodynamic data.

1. Aluminum is an effective additive to solid rocket fuel (for example, see KHIIMIYA I ZHIZN', 1983, No 12) because when it burns it releases a great amount of heat per unit mass and consequently produces a very high temperature. Numerical evaluation of fuel efficiency is conducted by thermodynamic analysis of the temperature and composition of combustion products. This is just how data of the enthalpy of the formation of AlO , Al_2O , Al_2O_2 and AlO_2 aluminum oxide molecules is also important.
2. At the present time, economical light sources are undergoing intensive development. This includes halogen lamps in which the vaporized tungsten released by the incandescence filament reacts with halogens to form combustible halogenides and therefore prevents the tungsten from being deposited onto the walls of the retort. Thermodynamic calculations have shown that a fluorine additive may considerably improve the output of light because it substantially raises the temperature of the filament. In contrast to other halogenides, tungsten fluoride compounds are broken down on the filament itself rather than in its proximity. Therefore, the tungsten is recycled onto the filament which extends its service life.
3. Potassium compounds and especially potash are used as an ionizing additive to increase the conductivity of fuel combustion products in the channel of a magnetic hydrodynamic generator. What are the possible applications of these additives at the temperatures and pressures found under the conditions of fuel combustion? Thermodynamic calculations have shown that not all of the potassium appears in the form of atoms capable of ionizing with the formation of K^+ ions and electrons. A noticeable portion of the potassium released is bound in the form of KOH molecules that take no part in the ionization. The calculations have made it possible to correctly foretell how the conductivity of combustion products depends on their composition and temperature.

On the whole, high-temperature mass-spectrometry has made an enormous contribution to fundamental research in inorganic chemistry. Many of its results have found considerable practical use. The following words of D. I. Mendeleev are fully true in this regard:

"Scientific study has two main and final goals: prognostication and application".

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12261

CSO: 1841/111

UDC 543.42:546.33:546.32

ATOMIC ABSORPTION MEASUREMENT OF SODIUM AND POTASSIUM IN BIOLOGICAL SAMPLES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 1, Jan 85
(manuscript received 23 Mar 83) pp 100-108

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[Abstract] The goal of improving the accuracy of measuring sodium and potassium in biological samples has taken on great importance in connection with the role of these minerals in various physiological processes. The present work reports on atomic absorption analysis of simple models and complex natural structures, and the results obtained with different equipment, using flame as the atomizer. Physical effects of the matrix structure such as viscosity and surface tension, ionization disturbances and base electrolyte effects, as well as various absorbed impurities, all have a bearing on measuring accuracy. Equipment parameters including signal drift due to cathode tube lamp heating, wave length and concentration levels, and other mechanical and physical considerations, are discussed. Experiments analyzed 42 samples of meat, fish and other maritime products, vegetables and animal feeds, with known sodium content of 0.01 to 0.5%, and potassium of 0.05 to 2%. Methods of concentrating elements in a solution and of dissolving them in 100 times volume with 1% cesium were tested. Concentration parameters and equipment settings for maximum accuracy are suggested. Figures 2; table; references 12: 7 Russian, 5 Western.
[185-12131]

UDC 543.42.062

EXTRACTION CHROMATOPHOTOMETRIC MEASUREMENT OF MICROQUANTITIES OF COPPER, CHROMIUM AND ZINC IN SEWAGE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 1, Jan 85
(manuscript received 3 Jan 84) pp 109-114

KORENMAN, Ya. I. and ALYMOVA, A. T., Voronezh Technologic Institute

[Abstract] While permissible levels of zinc, copper and chromium for water quality are specified, measurement procedures require use of dangerous quantities of toxic solvents and still give poor accuracy. The present article reports on study of an alternate method using extraction photometry with polysorb-1, a copolymer of styrene and divinylbenzene, as the carrier of immobile phases. The carrier was saturated with extracts dissolved in an organic solvent under vacuum, with excess solvent being filtered off. The remaining mixture was held for an hour, then analyzed. Processes for determining curves of sorption and desorption, and for measuring the three minerals, are summarized. Technical features of the columns and replication accuracy are discussed. Chloroform was regarded to be a promising elutriating agent for single analysis, while for series of tests HNO_3 was preferred for copper. For chromium the elutriating agent was 0.1 mol H_2SO_4 , and for zinc, 2.5 mol HCl . Figures 3; table; references: 6 Russian.
[185-12131]

UDC 543.3:546.267:535.379

NEW METHODS FOR DETERMINING NANOGRAM QUANTITIES OF CYANIDE AND THIOCYANATE IONS USING INHIBITION OF CHEMILUMINESCENCE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 1, Jan 85
(manuscript received 30 Jan 84) pp 120-124

ZUY, O. V., TERLETSKAYA, A. V. and PILIPENKO, A. T., Institute of Colloid Chemistry and Water Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] As toxic compounds, simple and complex cyanides are regulated in the water supply. The present article reports on studies to improve the sensitivity of measurements of CN^- and SCN^- ions by analyzing chemiluminescent reactions of luminol. After determining halogen content by iodometric or argentometric methods, chemiluminescent intensity was measured by placing solutions with varying amounts of cyanide or thiocyanate ions in cuvettes, dissolving them with water and adding either halogens or cobalt salts. The latter added to luminol resulted in pronounced luminescence, while with hypohalogenites, lesser luminescence occurred. CN^- and SCN^- had the greatest inhibiting effect with L--ClO^- and L--BrO^- . These tested methods were useful in determining cyanide content in sewage and HCN in the atmosphere, with accuracy of 0.5 and 0.3 ng/ml for CN^- and SCN^- , respectively. Figures 4; tables 2; references 16: 11 Russian, 5 Western.
[185-12131]

UDC 543.544.6:62-784.222.2

IONOMETRIC METHOD FOR MEASURING PRIORITY GAS ATMOSPHERIC POLLUTANTS

MOSCOW ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 1, Jan 85
(manuscript received 5 Aug 83) pp 141-144

GORINA, M. Yu., PISKUNOVA, L. P., PIVOVAROVA, N. O. and SHOR, N. B.,
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[Abstract] It is noted that a fundamental task today for protecting the environment is controlling atmospheric pollutants. The ionometric procedure described in the present article provides efficient and accurate monitoring of SO_2 , H_2S , Cl_2 , O_3 , NO and NO_2 . Preparation of electrodes and standards for monitoring are discussed. Experiments to establish the dependability and accuracy of the tests were conducted over 3-6 months. Results were compared to those received by gravimetric procedures with readily ignited gases, and by photocolorimeter tests for other gases. Results showed that iodide concentration in the solution prior to SO_2 absorption should not be less than $5 \cdot 10^{-5}$ mol/l. Hydrogen sulfide could be detected either with neutral or slightly alkaline solutions, or in strong alkaline solutions. NO_2 and NO in concentrations of 10 to 240 mg/m^3 could be measured with nitrate-coated electrodes, while for lower (0.01 - 10 mg/m^3), iron-containing electrodes were effective. Results were accurate to $\pm 3\%$, and did not diverge from gravimetric tests by more than 1% ; these results were better than those obtained by photocolorimetry. References 13: 10 Russian, 3 Western.
[185-12131]

UDC 546.65+535.372

LUMINESCENCE OF SAMARIUM, EUROPIUM, TERBIUM AND DYSPROSIUM IN COMPOUNDS WITH IMIDAZOLE-4,5-DICARBOXYLIC ACID

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 1, Jan 85
(manuscript received 4 Nov 83) pp 66-68

KRAVCHENKO, T.B., BEL'TYUKOVA, S.V., POLUEKTOV, N.S., KONONENKO, L.I. and IVANOV, E.I., Physical-Chemical Institute, UkSSR Academy of Sciences, Odessa

[Abstract] The luminescence of Sm^{+3} , Eu^{+3} , Tb^{+3} and Dy^{+3} in various compounds is of interest in laser technology and analysis, while imidazole-4,5-dicarboxylic acid is used as an intermediate product in organic synthesis. In the present work the luminescent properties of lanthanoid complexes with imidazole-4,5-dicarboxylic acid were studied using 0.1M solutions. Luminescence was induced with a mercury-quartz lamp and the spectra recorded at 450-640 nm. The study shows that the complexes may be used to determine Eu, Tb and Dy in lanthanoid oxides. Figures 3; references 10: 6 Russian, 4 Western.
[164-12765]

UDC 543.436+546.131

DETERMINATION OF MICRO QUANTITIES OF CHLORIDE IONS IN ELECTROLYTE CONTAINING
ETHYLENE GLYCOL

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 1, Jan 85
(manuscript received 21 Nov 83) pp 76-77

GAVRILYUK, A.I., KOSHELEVA, S.I., KIRPICHENKO, O.V., BUCHKO, O.A. and
KURILO, O. S., L'vov State University

[Abstract] A procedure was developed to determine micro quantities of chloride ions present in a condenser electrolyte containing ethylene glycol, boric acid, ammonia and small amounts of phosphoric acid (0.01%). Separation of the chloride ions as hydrogen chloride was not possible, nor was oxidation with potassium periodate or permanganate owing to the presence of ethylene glycol. A turbidometric technique was also not feasible. Organically bound chloride was determined by heating the electrolyte with ammonia to separate the boric acid. After cooling, 8M nitric acid was added to pH 0.2-0.3 and the solution allowed to stand for 1 - 1.5 hours, after which the solution was filtered and 2 ml of 5×10^{-3} M silver nitrate added. The resulting suspension was then heated, cooled rapidly, and its optical density measured. The relative error comprises $\pm 5-10\%$. References 6: 3 Russian, 3 Western. [164-12765]

UDC 543.70

BIS-ALIZARIN-ETHYLENEDIAMINE - NEW REAGENT FOR GERMANIUM

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 123-126

ALIYEVA, R.A., Azerbaijan State University imeni S.M. Kirov

[Abstract] An extraction-photometric technique was developed for determining germanium within a concentration range of 7-51 micrograms of Ge per 10 ml, a sensitivity according to Ye.B. Sendel of 1.32×10^{-2} microgram/cm² and $\pm 2.0\%$ error. The selectivity of the method was studied and ways for increasing it are proposed. The method was used to study interaction of Ge (IV) ions with a new reagent, bis-alizarin-ethylenediamine. Optimum conditions are pH 7, 503 nm wavelength and 1:1 complex composition. Figures 3; references 4 Russian. [162-12765]

CATALYSIS

CATALYSTS IN ORGANIC CHEMISTRY AND POLLUTION CONTROL

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian, 22 Jan 85 p 3

[Article: "Chemistry Serves Intensification" by D. Sokol'skiy, Director, Institute for Organic Catalysis and Electrochemistry, Kazakh SSR Academy of Sciences]

[Text] Special attention is now being paid to the use of new catalysts in stepping up the productivity of the chemical, petroleum refining, and petrochemical industries. Such catalysts greatly accelerate chemical reactions and substantially increase the productivity of technological installations producing products and materials necessary for the national economy. Catalytic processes play a significant role in the fulfillment of the Energy and Food Programs, the utilization of secondary sources of raw materials, and in environmental protection.

The Institute for Organic Catalysis and Electrochemistry of the Kazakh SSR Academy of Sciences [AN KazSSR] has developed a number of new catalysts and catalytic systems which are now in operation in industry. Stationary catalysts have been devised for the hydrogenation of fats. They have been tested in large scale pilot and industrial installations and are now being used in the new workshops at the Gorky Fat and Oil Refinery, the Kazan Chemical Plant [Khimkombinat] and the Chimkent Fat and Oil Refinery.

Catalysts for producing cooking oils have passed through the stage of industrial adoption. Earlier, stationary catalysts of this type were not used in industry because of their short service life -not exceeding two months. The new ones will operate for 4 years. It is no longer necessary to manufacture them frequently at the plant. The filtration stage of the product being produced is eliminated. And what is especially important, the process of fat hydrogenation is now being accomplished by a continuous technology.

The second cycle of research of the institute that is now being implemented in industry involves the purification of industrial and waste gases from factories and the exhaust gases of internal combustion engines. The catalysts of the institute have been adopted at tens of plants in the Soviet Union for the purification of acetylene.

An entire series of catalysts was devised by the institute for afterburning the exhaust gases of the organic chemical industry. They are being used in

the Kiev Pharmaceutical Plant and in a number of other enterprises. Their adoption will have both economic and social benefits (environmental protection). Here is an example of the protection of the health of the workers in phosphorus plants. The catalyst is applied to a special fabric which, in the form of a mask (Lepestok E) does a good job of protecting the respiration of the workers from phosphine, arsine, and hydrogen sulfide. Tens of millions of such masks are being manufactured.

The most difficult task for the institute was to devise catalysts for after-burning [catalytic conversion] of the exhaust gases of internal combustion engines of automobiles. The difficulty lies in the fact that the flow rates of the gases are very high. And they must be purified simultaneously of carbon monoxide, oxides of nitrogen and organic substances [hydrocarbons]. The requirements imposed on catalysts for each of these processes vary. In view of the highly variable modes of motion, great strength is also required of the catalysts. Among our many catalysts, low-percentage palladium on aluminum oxide occupies a firm position. It is produced on an industrial scale. And also a catalyst on a metal block carrier which is being tested in a factory in the city of Togliatti. A shortcoming of these catalysts, as with all presently-known catalysts, is the instability in the presence of lead compounds (ethylated gasoline). But in many cities of the Soviet Union wherever unleaded gas is used, they can be operated for quite a long time.

Mechanisms equipped with internal combustion engines are often used in closed spaces. The air is polluted by carbon monoxide and other substances--the result of incomplete combustion of the fuel. In such cases, the microclimate is seriously impaired, for example, in the buildings of livestock complexes. The institute has concluded an agreement for scientific and technical cooperation with the Kazakh Research Veterinary Institute of the Eastern Division of VASKh-NIL. According to the agreement, metal converters are to be manufactured for feed-distributing tractors. Such a converter has also been installed at the Oktyabr' Kolkhoz (Taldy-Kurgan Oblast). The concentration of carbon monoxide in the exhaust gases decreases from 1.2 to 0.15% when it is in use.

The institute has also devised and implemented the technology for the production of high-purity metals by the amalgam method--such as cadmium, lead, gallium, and mercury. The technology for producing amalgams of high-purity sodium for manufacturing high-pressure lamps has also been developed and implemented. Development work is being done on energy storing substances.

It goes without saying that all of this represents the result of tremendous theoretical work on fundamental research. On this basis, today it is possible to predict the activity of catalysts and to develop optimal compositions for them with the lowest expenditure of time and money.

The economic benefit from the adoption of the above-listed developments now amounts to tens of millions of rubles, according to the records of the enterprises and when they are adopted on a full scale, the savings will reach hundreds of millions of rubles.

The staff of the Institute for Organic Catalysis and Electrochemistry of AN KazSSR is trying to make a valuable contribution to accelerating scientific and technical progress and is making every effort to fulfill the planned assignments for 1985 and the 11th Five Year Plan.

12822

CSO: 1841/160

UDC 541.128:541.49

STUDY OF DESTRUCTIVE HYDROGENATION CATALYSTS BASED ON HETEROPOLY-COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1,
Jan 85 (manuscript received 27 Sep 83) pp 18-24

NAVALIKHINA, M. D., SPITSYN, V. I., KOLLI, I. D., GORDEYEVA, G. A.,
SLINKIN, A. A. and GOLOVINA, G. S., Institute of Fossil Fuels, USSR Ministry
of Coal Industry, Moscow; Moscow State University imeni M. V. Lomonosov;
Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of
Sciences, Moscow

[Abstract] In recent years the use of heteropoly-compounds (HPC) in catalytic processes increased substantially. The goal of the present work was to study the application of low content Ni catalysts with HPC additive in liquid phase hydrogenation of coal in tetraline, including destructive hydrogenation and direct hydrogenation of the coal fragments formed along with hydrogen transfer by tetraline. The results showed that by varying the concentration of HPC on various carriers, one can reach optimal yield of liquid products. The HPC studied appeared to act as structuralizing promoters with a definite effect on the dispersiveness of the component metal and a stabilizing action of nickel particles with $<30 \text{ \AA}$ size. The heteropolytungstenate did not decompose even at 400°C . In a reducing medium, HPC convert to the reduced state but do not break down to simple oxides. Figures 4; references 15: 11 Russian (2 by Western authors), 4 Western.
[172-7813]

UDC 541.128:546.725 + 549.67:542.91:547.21

STUDY OF CATALYTIC PROPERTIES OF IRON CARBONYLS DEPOSITED ON ZEOLITES IN
SYNTHESIS OF HYDROCARBONS FROM CO AND H₂

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1,
Jan 85 (manuscript received 24 Jun 83) pp 24-29

LAPIDUS, A. L., SAVEL'YEV, M. M., MURANOVA, L. M., SOMINSKIY, S. D.,
KONDRAT'YEV, L. T., BORISOVICH, I. G. and VASSERBERG, V. E., Institute of
Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The goal of this work was to study the behavior of Fe(CO)₅/NaY
and Fe(CO)₅/CaY catalysts in synthesis of hydrocarbons from CO and H₂. Using
IR spectroscopic method, it was shown that adsorption of Fe(CO)₅ on NaY and
CaY zeolites leads to the formation of the following complexes: [Fe₃(CO)₁₁]⁻²,
[Fe₄(CO)₁₃]²⁻ and [HFe₃(CO)₁₁]⁻ which, under the reaction conditions studied,
formed active centers of the catalysts, facilitating production of alkanes
from CO and H₂ at 250-400° and 1 atm. Na⁺ and Ca²⁺ zeolites exhibited about
the same activity but their selectivity was different. These catalysts showed
activity only above 200°, i.e., at temperatures of the decarbonylation of the
starting clusters. Figures 2; references 7: 3 Russian, 4 Western.
[172-7813]

UDC 541.128.34:541.49:546.56:542.943.7

CATALYTIC ACTIVITY OF COPPER BISTHIOSEMICARBAZONATES IN SOME MODEL OXIDATION
REACTIONS OF BIOLOGICAL SUBSTRATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1,
Jan 85 (manuscript received 28 Oct 83) pp 29-33

DILANYAN, E. R., MIRONOV, Ye. A., TUVIN, M. Yu. and VOL'PIN, M. Ye.,
Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy
of Sciences, Moscow

[Abstract] A number of bithiosemicarbazones (bis-TSC) exhibit high anti-
tumor and antiviral activity. An assumption was made that the biological
activity of bis-TSC complexes is due to their catalytic properties in oxida-
tion of cellular substrates. To verify this, catalytic activity of Cu-complexes
of bis-TSC in oxidation of cysteine and hydroxyquinone with molecular oxygen
was studied. On the basis of a Cu-complex of bis-TSC of 3-ethoxy-2-
oxobutyraldehyde, a mechanism of the catalytic action of these complexes was
proposed. Thus it was shown that the biological activity of Cu (II)
bithiosemicarbazones may be of a catalytic nature. Figure 1; references
11: 5 Russian, 6 Western.
[172-7813]

UDC 541.12.035:546.92:541.128

EFFECT OF PLATINUM CONCENTRATION AND DISPERSION ON DEACTIVATION OF ALUMINUM-PLATINUM CATALYSTS IN DEHYDROGENATION OF HIGHER n-PARAFFINS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan 85 (manuscript received 27 Feb 84) pp 194-197

TYUPAYEV, A. P., TIMOFEYEVA, Ye. A. and ISAGULYANTS, G. V., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Effect of the concentration and dispersiveness of Pt in aluminum-platinum catalysts (APC) on deactivation during dehydrogenation of higher paraffins was studied. With catalyst concentration being kept constant, it was shown that the stability of APC's is directly related to the content and dispersiveness of platinum in the catalyst. Further, it was established that the higher the activity of a catalyst, the more stable it was and much less coke formed per unit of the converted paraffin. Figure 1; references 4 (Russian).

[172-7813]

UDC 543.422.4:547.1'128

IR SPECTROSCOPIC STUDY OF SI-SUBSTITUTED 1,2-DISILYLETHYLENE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan 85 (manuscript received 1 Mar 84) pp 197-199

VORONKOV, O. G., SHERGINA, N. I., SHERSTYANNIKOVA, L. V., YAROSH, O. G. and SHCHUKINA, L. V., Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] The frequencies and integral intensities of absorption bands of individual bonds were established for $X_3SiCH=CHSi(CH_3)_2Y$ type compounds using IR spectroscopy. It was verified that Si-substituted 1,2-disilylethylenes (I) are in trans configuration. In these compounds, interaction between Si atoms and the π -electron system of the double bond lowers considerably its ability to form hydrogen bonding. Figure 1; references 12: 10 Russian (one by Western author), 2 Western.

[172-7813]

UDC 542.97:547.254.6

**CROSS-COUPLING OF DIALKYL MAGNESIUM DERIVATIVES WITH ALKYL COMPOUNDS
CATALYZED WITH COPPER SALTS**

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1,
Jan 85 (manuscript received 28 Mar 84) pp 211-213

IBRAGIMOV, A. G., SARAYEV, R. A. and DZHEMILEV, U. M., Institute of
Chemistry, Bashkir Branch of USSR Academy of Sciences, Ufa

[Abstract] Reaction of dialkyl- and diarylmagnesium organic reagents with simple and complex allyl esters, thioesters and allylamines was studied as a function of transition metal salts. Preliminary studies showed that Cu salts activated with Ph_3P exhibited excellent catalytic activity, especially in THF (4 hrs at 40°). Under these conditions, Ph_2Mg and dihexylmagnesium react with allyl esters of acrylic, methacrylic, cinnamic and benzoic acids. Thus it was shown that the cross-coupling of dialkyl Mg derivatives with simple and complex allyl esters, sulfides and quaternary allylamines catalyzed by Cu salts appears to be an effective method for the synthesis of unsaturated hydrocarbons. References 10: 2 Russian, 8 Western.
[172-7813]

UDC 542.97:547.313.9:546.262.3-31

**CARBONYLATION OF NONENE-1 OVER Pd(II) COMPLEXES IN ALCOHOLS AT LOW PRESSURE
OF CO**

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1,
Jan 85 (manuscript received 24 May 84) pp 233-235

KARPYUK, A. D., TEREKHOVA, M. I., KOLOSOVA, N. D., PETROV, E. S. and
BELETSKAYA, I. P., Physical-Chemical Institute imeni L. Ya. Karpov, Moscow

[Abstract] Effect of acetone on carbonylation of olefines in other aliphatic alcohols catalyzed by Pd(II) complexes was studied. As a rule, total yield of the products in normal alcohols increased in the series $\text{PrOH} < \text{BuOH} < \text{HeptOH}$, while barely affecting the selectivity. Addition of acetone to alcohol had no effect on the yield when the reaction was run in PrOH but lowered it in BuOH and $n\text{-HeptOH}$; selectivity was decreased in all cases under the influence of acetone. References 6: 3 Russian, 3 Western.
[172-7813]

UDC 541.18.047

EFFECT OF COMPACTING PRESSURE ON STRUCTURE OF CARRIERS OF HIGH TEMPERATURE CATALYSTS

Minsk VESTSI AKADEMII NAVUK BSSR: SEYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 19 Mar 84) pp 10-13

KOMAROV, V. S., SKURKO, O. F. and REPINA, N. S., Institute of General and Inorganic Chemistry, BSSR Academy of Sciences

[Abstract] Carriers used for high temperature catalysts have a relatively low mechanical strength. To correct this, the air-dried mixture of metal hydroxide and burning-out additive was compressed and calcined at 1000°C, following which carbon was removed by oxidative sample regeneration at 650-700°C. Effect of compacting pressures on the structure of such carriers was studied. The experimental data showed that within the studied pressure range, complete removal of sample porosity was not possible, since both carbon and Al_2O_3 themselves had a certain pore volume; however, in general an increase in the pressure led to diminished pore volume and lower sorption capacity of the samples after the regeneration. The pressure was directed at the macroporous volume primarily, prevailing over compression of smaller pores, which disappeared usually during the thermal treatment. Figures 2; references 2 (Russian).

[139-7813]

UDC 547.217.2 + 542.97

DEHYDROCYCLIZATION OF n-PARAFFINS OVER ALUMINUM-CHROMIUM-VANADIUM CATALYST

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 28 Nov 83) pp 103-105

KOZLOV, N. S., OSINOVIK, Ye. S., PRYAKHINA, N. Ya., SEN'KOV, G. M. and GORBATSEVICH, M. F., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences

[Abstract] Dehydrocyclization of n-hexane and n-octane over CrO_3 , V_2O_5 and Al_2O_3 catalysts obtained from a double salt $[2(\text{NH}_4)_2\text{O} \cdot \text{V}_2\text{O}_5 \cdot 2\text{CrO}_3 \cdot 7\text{H}_2\text{O}]$ was investigated showing that they approached the quality of aluminum-platinum catalysts. A 10% increase of V_2O_5 and CrO_3 content in the catalyst led to a 27% increase of the aromatic products. A catalyst containing 1.5% NiO , 17.3% MoO_3 and 81.2% Al_2O_3 led to a 37.9% dehydrocyclization of n-paraffins. References 18: 14 Russian, 4 Western.

[139-7813]

UDC 547.244;54-39

PRODUCTION OF CARBORAN CONTAINING PEROXYESTERS UNDER CONDITIONS OF INTERPHASE CATALYSIS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 14 Jun 84) pp 105-107

CHURKINA, L. A., ZVEREVA, T. D., MALASHONOK, L. I. and OL'DEKOP, Yu. A., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences

[Abstract] Synthesis of carboran-containing peroxyesters by reaction of o-(m)-carboran-carboxylic acid hydrochloride (I) with hydroperoxides was described in an earlier paper. In order to simplify this process, the reaction of I with tert-butylhydroperoxide (II) was performed under conditions of interphase catalysis, avoiding the need for diethyl ether and pyridine. The reaction was based on adding I in methylene chloride at 0°C to a mixture of II, 20-40% NaOH solution and the interphase catalyst, triethylbenzylammonium chloride with vigorous stirring. The stirring was continued while bringing the system to room temperature. In this fashion the yield of peroxyester was increased to 70% without additional purification. References 2 (Russian).

[139-7813]

UDC 541.183.03

EFFECT OF PRETREATMENT ON PHASE COMPOSITION AND STRUCTURE OF SKELETAL RHODIUM-RUTHENIUM CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85 (manuscript received 18 Apr 83) pp 53-57

GRISHINA, T. M., Chemistry Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] Effect of pretreatment on phase composition and structure of skeletal rhodium-ruthenium catalysts was studied on freshly prepared samples, on artificially-aged (stabilized) samples and on actually-aged specimens. It was shown that for freshly prepared catalysts, the dimensions of crystallite blocks increased with increased content of ruthenium in the specimen; no change in dimensions of thermally stabilized catalysts was noted. During the process of artificial aging, which is completed in about 20 hrs, there occurs a recrystallization of the catalyst and the surface area of these catalysts is diminished. Actual aging results in decreased size of catalytic particles. Experimental results obtained by the electrochemical method were compared with BET data; the differences were explained by characteristics of microporous structures of these catalysts and by changes undergone during pretreatment. Figures 2; references 16:

15 Russian. 1 Western.

[175-7813]

UDC 541.128

ATOMIC ENSEMBLES IN CATALYSIS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85
(manuscript received 28 Jun 83) pp 58-59

YEROFYEV, B. V., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences, Minsk

[Abstract] N. I. Kobozev developed the theoretical concept of catalytically active atomic ensembles on the surface of solid catalysts. In absence of analytical methods capable of proving existence of such groupings, he turned to synthetic methods creating such ensembles. Current experimental data from other laboratories were reviewed supporting this concept. The concept of atomic ensembles could be expanded to include not only catalytically active homogeneous atoms, but also other types, including organic molecules binding these atoms into single catalytically active clusters. References 4: 2 Russian, 2 Western.
[175-7813]

UDC 66.092.412.35:655.663

STUDY OF FORMATION KINETICS OF CONDENSATION PRODUCTS DURING CATALYTIC PYROLYSIS OF INDIVIDUAL HYDROCARBONS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85
(manuscript received 21 Nov 83) pp 191-193

ADEL'SON, S. V., SMIRNOVA, G. Yu. and RUDYK, Ye. M., Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] During thermal pyrolysis, the rate of coke accumulation depends on the composition of the reacting substances. Coke formation was studied in catalytic pyrolysis of various hydrocarbons over modified vanadium catalyst. The following series was observed in regard to the tendency of coke formation: n-octane < cyclohexane < isooctane < py-xylene. The rate of coke formation increased with higher temperature of pyrolysis and decreased with accumulation of coke. It was shown that the polycondensation monomers in catalytic pyrolysis of these hydrocarbons are principally unsaturated compounds capable of polymerization (olefines, dienes, acetylenes). The structure of coke deposits depends on the composition of reacting materials. Coke is deposited in fine pores of the catalyst, blocking them from further action. Figures 2; references 4: 3 Russian, 1 Western.
[175-7813]

UDC 541.128

EFFECT OF IODIDES ON CATALYTIC AND ADSORPTION PROPERTIES OF DEPOSITED
PALLADIUM CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85
(manuscript received 23 May 83) pp 232-234

OMARKULOV, T.O., MUKATAYEV, Zh., GONCHAROVA, S. V. and SOKOL'SKIY, D. V.,
Institute of Organic Catalysis and Electrochemistry, KazSSR Academy of
Sciences, Alma-Ata

[Abstract] Catalytic and adsorption properties of deposited palladium catalysts (0.5%Pd/CoCO₃, ZnO and Pd-black) with or without added alkali metal iodides (Li, K, Na) were studied using the hydrogenation reaction of dimethylethynylcarbinol (I) to dimethylvinylcarbinol (II) as a model. Selectivity of the catalysts in this reaction could be arranged in the following order: Pd-black < Pd/C < Pd/Shas < PdNaX < Pd/Al₂O₃ < Pd/BaSO₄ < Pd/MgCO₃ < Pd/MgO < Pd/ZnO < Pd/CaCO₃. Addition of LiI, NaI or KI to the reaction mixture increased the yield of II. In addition, the nature of the carrier and hydrogen pressure had a definite effect on the kinetics and selectivity of this process. Figures 2; references 4 (Russian).
[175-7813]

UDC 541.15 +542.941

ADSORPTION STUDY OF IRRADIATED CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85
(manuscript received 26 May 83) pp 239-240

KUZEMBAYEV, K. K., ZHANBEKOV, Kh. N. and ASUBAYEV, M. K., Institute of
Organic Catalysis and Electrochemistry, KazSSR Academy of Sciences, Alma-Ata

[Abstract] The effect of γ -irradiation on specific and metallic surface of platinum and palladium catalysts deposited on silica gel was studied. Irradiation of the carrier led to a sharp drop of the number of pores with dimensions of 2-3 nm. In respect to chemisorption, ionizing radiation led to progressive enlargement of palladium crystals with dose increase. The opposite is observed with platinum. Overall, changes were noted in porosity and dispersiveness of the active phase. Figure 1; references 3 (Russian).
[175-7813]

UDC 542.943.73:533.7

DEVELOPMENT OF Fe-Cr-Cu-Ni OXIDE CATALYST FOR OXIDATION OF SO₂ AND STUDY OF KINETICS OF PROCESS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85 (manuscript received 6 Apr 84) pp 42-45

DADAKHODZHAYEV, A. T. and DZHALILOVA, F. F., Tashkent Polytechnic Institute imeni A.R. Beruni

[Abstract] One of the most effective ways for treating sulfur dioxide present in off-gases is catalytic oxidation to SO₃, and while vanadium pentoxide is satisfactory for this purpose, it requires that other gas impurities be thoroughly removed first. An iron and chromium oxide catalyst, however, has high resistance to poisoning and heat. In the present work a study was made of the effects of adding copper and nickel on the activity of this catalyst and the kinetics of the oxidation process. Nine catalysts containing varying amounts of copper and nickel were prepared and tested. The results show that the copper-containing catalysts have the highest activity, but it decreases with increasing copper content. Of the catalysts containing nickel, greatest effect was obtained with 1:1 ratio of CuO:NiO. An equation is presented by which it is possible to determine the contact time needed to convert SO₂ to SO₃ in a gas. The results were used to compute catalyst volume in an industrial reactor for treating off-gases. Figures 3; references 6: 5 Russian, 1 Western.

[176-12765]

UDC 541.128+66.0918

STUDY OF EFFECTS OF OXIDES OF CERTAIN RARE AND RARE EARTH ELEMENTS ON PROPERTIES OF MOLYBDENA-ALUMINA CATALYSTS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84 pp 3-5

DADASHEV, B.A., ABBASOV, S.G., SARYDZHANOV, A.A., GUSEYNOV, M. M. and MELIKOV, T.M., Azerbaijan Engineering-Design Institute

[Abstract] The effects of adding 2.5% rubidium, cesium, cerium and neodymium oxides to molybdena-alumina catalysts on the structure and activity of the latter in n-hexane dehydrogenation were studied. The results show that promoting the catalysts with rubidium and cerium increases the dispersion by 4 Å, while promoting with cesium and neodymium oxides increases it by 10 Å, i.e., the size of the microcrystallites decreases. The change in dispersion and physical chemical parameters of the catalysts has a marked effect on their activity in n-hexane dehydrogenation at 530°C and 0.35 hourly space velocity. The catalysts were prepared at the laboratory of chemistry and technology of semiconductor catalysts of the Institute of Petrochemical Production, AzSSR Academy of Sciences. References 5 (Russian).

[162-12765]

UDC 541.128:556.77

PHYSICAL CHEMICAL PROPERTIES OF P-Mo OXIDE SYSTEM AND ITS CATALYTIC ACTIVITY
IN REACTIONS OF PROPYLENE OXIDATION IN PRESENCE OF AMMONIA

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 17-22

GADZHIYEV, K.N., ALIYEV, E.A. and KHANMAMEDOVA, A.K., Azerbaijan Institute
of Petroleum and Chemistry imeni M. Azizbekov

[Abstract] The P-Mo oxide system as an olefin oxidizing catalyst has not been studied. In the present work a study was made of the physical chemical properties of P-Mo oxide catalysts of 1:1, 1:6, 1:12, 1:18 and 1:24 P:Mo ratios, and the catalytic properties of this system in ammonia and propylene oxidation reactions as well as oxidative ammonolysis of propylene. X-ray phase analysis shows that for ammonium para-molybdate and ortho-phosphoric acid solutions of up to pH 0.5, the precipitate contains $(\text{NH}_4)_3\text{PO}_4(\text{MoO}_3)_{12} \cdot 4\text{H}_2\text{O}$ which remains thermally stable at 390-670K. At 720-770K, the P-Mo heteropoly compounds of 1:12 P:Mo ratio decompose, apparently, to form a solid solution of phosphorus in MoO_3 . The calcining temperature and the pelletizing pressure affect the distribution of X-ray diffraction maxima in P-Mo oxide systems calcined at 770-970K. Figures 3; references 6: 5 Russian, 1 Western. [162-12765]

UDC 541.28

STUDY OF ACTIVITY OF DEALUMINIZED CLINOPTILOLITES IN ISOMERIZATION REACTIONS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 24-26

ZUL'FUGAROV, Z.G., DADASHEVA, Sh.A. and MAMEDOVA, T.Kh., Institute of Inorganic and Physical Chemistry, AzSSR Academy of Sciences

[Abstract] A study shows that treating clinoptilolites from the Aydag deposit with hydrochloric acid of 0.1 to 5 normal in concentration results in dealuminization and decationization, whereby the silica-to-alumina ratio changes from 4.0 to 10. Isomerization of n-hexane under normal pressure over dealuminized clinoptilolite containing 1% rhenium and platinum results in up to 35% isomer yield with 83.6% selectivity. Figure 1; references 4 (Russian). [162-12765]

UDC 541.183.5

STUDY OF ADSORPTION PROPERTIES OF NATURAL MORDENITE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 27-30

ANNAGIYEV, M.Kh., Institute of Inorganic and Physical Chemistry, AzSSR
Academy of Sciences

[Abstract] A correlation was established between the physical chemical parameters and the adsorption properties of natural mordenites treated with varying concentration of sulfuric acid. A study of the adsorption properties of natural mordenites from Nakhichevan ASSR during drying with toluene shows that as the concentration of activating acid is increased, the drying capability first increases and then decreases. Figures 3; references 4: 3 Russian, 1 Western.
[162-12765]

UDC 541.124.13

OXIDATION OF CO OVER MIXED OXIDE CATALYSTS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 3-6

ZUL'FUGAROV, Z.G., MAMEDOVA, Z.A. and MAMEDOV, M.B., Institute of National Economy imeni D. Buniat-zade

[Abstract] Mixed oxide catalysts have been proposed as low-cost substitutes for platinum group metals to detoxify gases containing carbon monoxide by post oxidation to carbon dioxide. In the present work a study was made of the activity of mixed iron, chromium and aluminum oxides on silica catalysts in the oxidation of CO to CO₂. The results show that these catalysts provide complete oxidation at 150°C and up to 6% carbon monoxide concentration in a gas-air mixture. Introduction of magnesium in place of aluminum to the catalyst improves its oxidizing and cracking activity. Figure 1; references 4 (Russian).
[163-12765]

CATALYTIC CRACKING OF VACUUM DISTILLATE OF HIGH SULFUR CRUDE IN PILOT SCALE UNIT WITH OPEN AND SEMI-OPEN ZEOLITE-CONTAINING CATALYST BEDS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 7-11

BASIL, I.K. and SEID-RZAYEVA, E.M., Institute of Petrochemical Processes, AzSSR Academy of Sciences imeni Yu.G. Mamedaliyev

[Abstract] Zeolite-containing silica-alumina catalysts have helped to improve gasoline yields over that of amorphous silica-alumina catalysts in recent years. In the present work a study was made of pilot scale cracking of a vacuum distillate from a high sulfur crude over a zeolite-containing open bed catalyst initially and followed by a closed bed catalyst at 80 kg/hour through-put capacity. The results show that maximum yield of motor fuel is obtained at 500°C and 8.0 hourly space velocity. Increasing the temperature to 520°C results in lower motor fuel yield. Figure 1; references 7: 4 Russian, 3 Western.
[163-12765]

UDC 547(537+3)

ALKYLATION OF BENZENE WITH DODECENE-1 IN PRESENCE OF CATALYTIC SYSTEM
Al+HCl+TOLUENE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 25-28

MAGERRAMOV, M.N., USUBOVA, E.N., FARKHADOVA, S.M., BOGOLEPOV, A.V. and FARADZHEVA, E.Z., Azerbaijan State University imeni S. M. Kirov

[Abstract] Benzene was alkylated with dodecene-1 in the presence of a catalyst system consisting of Al+HCl+toluene and the optimal conditions for obtaining mono- and didodecyl benzene at 98% yield were determined. Alkylbenzene sulfonates prepared from the dodecyl benzenes may be used as synthetic detergents and foaming agents. They are considered as "biologically mild" surfactants. References 8: 4 Russian, 1 Czech, 3 Western.
[163-12765]

2 May 1985

UDC 542.973.8

OXIDATIVE REGENERATION OF ALUMINA-SILICA CATALYST FOR LIQUID PHASE ALKYLATION OF ALKYL BENZENES WITH STYRENE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 29-32

MUGANLINSKIY, F.F., ABDULLAYEV, F.Z., AMIROV, S.G., KULIYEVA, L.E. and KAKHRAMANOV, V.B., Azerbaijan Institute of Oil and Chemistry imeni M. M. Azizbekov

[Abstract] A study was made of the oxidative kinetics of regeneration of spent alumina-silica catalysts for alkylation of alkylbenzenes with styrene. The kinetic and extra-diffusional regions of the reaction were established. The diffusional region of the catalyst regeneration reaction is zero order while that of the kinetic region is first order. Figures 2; references 7: 2 Russian, 5 Western.
[163-12765]

UDC 546.77:541.128

STRUCTURE OF Sn-Mo OXIDE CATALYST AND ITS ACTIVITY IN PROPYLENE OXIDATION REACTIONS TO ACETONE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 17-20

KASUMOV, F.B., MAKHEK, Ya., IRU, P. and ADZHAMOV, K. Yu., Azerbaijan Institute of Oil and Chemistry imeni M. Azizbekov

[Abstract] A study was made of the structure of Sn-Mo oxide catalyst and its activity in the oxidation of propylene to acetone. The study shows that addition of 10 atomic % molybdenum to stannic dioxide results in the formation of a solid solution which is responsible for the formation of acetone in the oxidation of propylene. Figures 2; references 7: 3 Russian, 4 Western.
[163-12765]

CATALYTIC CONVERSION OF OLIGOMER OF C₅-FRACTION OF LIQUID PRODUCTS OF
PYROLYSIS TO OBTAIN CYCLOOLEFIN HYDROCARBONS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 33-36

GASANOV, A.G., MEKHTIYEV, S.D., SULEYMANOVA, E.T., PASHAYEVA, F.A. and
NAGIYEV, E.V., Institute of Petrochemical Processes, AzSSR Academy of
Sciences imeni Yu. G. MAMEDALIYEV

[Abstract] A study was made of the catalytic conversion of oligomers from
the C₅-fraction of liquid pyrolysis products over a commercially available
catalyst "Otsev", and the composition of the catalysate determined. A
process was developed for preparing cyclopentene which may be used as a
monomer for producing the new polypentanamer elastomers. References 14:
1 GDR, 3 Russian, 10 Western.
[163-12765]

CHEMICAL INDUSTRY

PETROCHEMICAL INDUSTRY ACHIEVEMENTS, GOALS

Kiev PRAVDA UKRAINY in Russian 9 Feb 85 p 2

[Article by A. Maslov: "From the UkSSR Main Administration of the Petroleum Refining and Petrochemical Industry Collegium: Counting on Intensification"; passage enclosed in slantlines printed in boldface in source]

[Text] The administration's collectives were ahead of schedule in fulfilling the five-year plan's fourth year goals for production volume, labor productivity and output of products bearing the State Emblem of Quality. During the five-year plan there have been increases in petroleum processing and in the production of high-octane gasoline grades, diesel fuel, fuel oil, tires and industrial rubber products. All basic technical and economic indicators were fulfilled in 1984. A proper ratio has been achieved between the rate of growth in labor productivity and average salary levels.

These achievements are due to the introduction of new equipment, the refitting and conversion of existing production and greater utilization of the production potential developed during the previous five-year plan. It is characteristic that during the last four years obsolete equipment was replaced with more efficient units at a rate 2.5 times that of the 10th Five-Year Plan. This has allowed wide-spread use of low-waste, energy-saving equipment, a 1/3 reduction in machine and plant downtime, a reduced level of wastage and an increased level of waste product utilization. The measures contemplated by the /"Energokompleks" [Energy Complex] and "Trud" [Labor] targeted republic-level scientific-technical programs/ have been implemented ahead of schedule. The tasks of saving fuel and energy resources and increasing labor mechanization and automation have also been fulfilled. The team concept for organizing labor and wages has been widely developed and has made a great contribution toward strengthening personnel discipline and reducing turnover. At the same time, G. Ye. Lesnichiyy, chief of the UkSSR Main Administration of the Petroleum Refining and Petrochemical Industry, reported that some enterprise collectives have not fully utilized their reserves to further increase production efficiency. They have not fulfilled planned production volumes for individual petroleum products and, as a result, have allowed breaches of delivery contract obligations. Required measures for reducing losses due to wastage, expanding product lines and improving the quality of items for domestic consumption have not been implemented in all areas. Attention was also focused

on the need to reduce unproductive expenditures, lower stores of valuable goods and materials that are in excess of plan requirements, increase savings and raise the level of economical work.

The Collegium approved socialist obligations for 1985 which specifically call for a beyond-plan 0.5 percent reduction in production costs, a 1 percent increase in labor productivity and early fulfillment of five-year plan assignment for that indicator by the 50th anniversary of the Stakhanovite Movement. The most important organizational and technical measures for 1985 were also confirmed. These are directed at eliminating existing shortcomings, removing production bottlenecks and assuring smooth plan fulfillment in terms of product line and delivery contract obligations. A decision was made to work for 2 days using saved raw materials and finished goods, and to work for 5 days using saved fuel and energy resources. In order to create conditions for efficient work during the 12th Five-Year Plan, determinations were made on the most important trends of accelerated development of industry, more efficient use of petroleum, and increased levels of technology in the tire and industrial rubber industry, as well as in enterprises devoted to the production of footwear and industrial carbon.

A. P. Sazonov, director of the Chemical Department of the Ukrainian CP Central Committee, and A. N. Butovich, director of the Chemical Industry Department of the UkSSR Council of Ministers, participated in the collegium's work.

12746

CSO: 1841/191

2 May 1985

NEW VACUUM UNIT AIDS ELECTRONICS INDUSTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Mar 85 p 1

[Article by N. Fedin, engineer: "Science to Production: The Vacuum at Work"]

[Text] Although it sounds paradoxical, modern industry would "suffocate" without a vacuum. Up to 80 percent of the industrial processes in microelectronics take place in an airless space. The reliability and service lives of many radio devices, both in industry and in homes, depend directly on the vacuum. Without it there would be no pure metals, alloys, monocrystals or semiconductors.

Horizons have greatly expanded for researchers, engineers and designers of the new technology. Soviet scientists have created and brought into production new magnetic-discharge supervacuum pumps. These can produce vacuum levels beyond those found even in space.

From the outside, the new unit looks like a solid metal box with a wide funnel on one side. The faculty director of the Moscow Electronic Machine Building Institute, A. Aleksandrova, doctor of technical sciences, explains:

"All in all, the term 'pump' isn't strictly accurate. It doesn't pump anything. The principle is quite different. Electrons activated by a magnetic field bombard sheets of chemically active titanium. The titanium disperses and, after coming into contact with air molecules, settles on the walls. A cut-off switch is activated and pressure in this efficient chamber drops sharply from a normal 760 mm Hg to 10^{-10} and then to 10^{-13} mm Hg. These results have been achieved with the assistance of one-way valves and gates.

"At our institute," continues Ariadna Timofeyevna [Aleksandrova], "a new family of switching/regulating mechanisms has been developed and it satisfies the most stringent industrial requirements. This has led to a tenfold increase in vacuum unit efficiency and a thousandfold improvement in sealing, together with a 3- to 5-fold savings in energy and material requirements. Most of the mechanisms have been designed for use with microprocessor-controlled systems without human intervention.

The joint efforts of scientists and designers have resulted in the creation of a reliable and efficient system which is highly valued by industrial workers. Its creators were awarded the USSR State Prize in 1984.

This achievement by Soviet scientists and designers will allow the improvement of most production processes in the electronics industry as well as the creation of fundamentally new ones. Some examples include thermal deposition of coatings, ionic spraying of materials, electron and proton processing of products, plasmochemical etching and electron-beam and thermodiffusion welding.

"The collective's important achievement," considers academician B. Paton, "is that domestic industry is already producing the high-vacuum units it has invented. They have found wide application in modern industrial and scientific equipment. They have also done much to reduce the critical lack of equipment for vacuum technology."

One effect of this innovation has been the over 310 million rubles earned by the domestic economy.

12746

CSO: 1841/191

PROBLEMS IN SUPPLYING PLASTICS FOR ELECTRICAL PRODUCTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Mar 85 p 2

[Article by G. Korotkov, deputy director of the Relay Building Scientific Research Institute and candidate of technical sciences: "Reserves for Accelerating Technical Progress: Large Losses in 'Small-Scale' Chemistry"]

[Text] More than 60 countries around the world are purchasers of Soviet electrical equipment--the relays, starters, automatic circuit breakers and other components which are indispensable today in every branch of industry. The figure is satisfying but, in spite of obvious successes, we electrical engineers have reason to be alarmed.

Good insulators, primarily plastic ones, are needed in every type of electrical device. These polymers have now taken on a decisive role in equipment design. The design of products containing them involves a third of all labor efforts. For this reason we do more than simply follow chemist's successes in this area, we allocate significant resources for their scientific research work. We must add that chemists have created a complete line of progressive innovations in recent years. With their introduction, we in this country began production of a new generation of compact and reliable electrical devices. The resultant advantages have been impressive.

For example the use of a glass-filled polyamide to produce the new series RP-20 starter relay has reduced its material requirement by 70 percent. Millions of these relays are being built. The savings per million units amount to 104 tons of rolled ferrous products, 73 tons of non-ferrous products and 100 tons of plastic.

This, however, is just a drop in the ocean. There are more than 10,000 items on the electrical product list. Replacing old polymers with new ones gives rise to a costly economic reaction. Thus, the use of new polymers already discovered by scientists is equivalent to a revolution in electronics which will be felt in all branches of industry. But a critical mass of raw materials is required to start this chain reaction and that is just what is missing.

In recent years, chemists have developed 24 types of structural plastics solely at the request of electrical engineers. Only 10 of these can be actually used and they are not being produced in quantity. Take the case of premix—a fundamental agent used in the pressing of high-load coils for electrical equipment. We receive only half the amount we require. The situation with thermoplastic material deliveries is even worse. While these polymers allow the establishment of nearly waste-free production, wastage is now running at 20-30 percent. In all, the situation is as follows: only half the polymers required for the product list are available and the delivery situation is worse—by 10-12 percent. A paradox has developed: we have nearly everything and yet nothing we need to begin our conversion. Because partial incorporation has no effect, individual component replacement does nothing but increase unit costs. As a result, instead of an effect we have a countereffect. The lack of required quantities of new materials is already leading to the loss of millions of rubles annually in the national economy. If the situation does not change the loss will grow to 40 million rubles annually within 5 years.

There is only one way to prevent this. Serious efforts must be directed toward reviewing all polymer products. Neither we nor other plastic-consuming branches need yesterday's products or even today's structural materials with physical, mechanical and especially technical properties which do not meet current requirements. But the basic production efforts of chemists are directed to just those two categories.

In the last 10-15 years there have been great changes in the production structure of the industrially developed countries. The high-impact polymers—polycarbonates and polyamides—have become fundamental in thermoplastic materials, which in turn make up more than half of the production volume. Cast units have become preeminent in the thermoreactive plastics. Thus, up to 90 percent of the structural polymers are now being made by an efficient, easily automated and highly accurate pressure die-casting method. This same technique results in a 2-3-fold increase in labor productivity while simultaneously reducing costs.

The fact that the new plastics appeared at about the same time here and abroad makes the situation that much worse. Premix, for example, has been produced for 10 years in this country. Unfortunately, in this case old-line production methods have not been replaced and there are no prospects for improvement. The former Deputy Minister of the Chemical Industry Ye. Vlaskiy reported in a letter to the Electronics Industry Ministry that premix production will still be at present levels in 1990.

How can this be explained? First of all, I believe that the production of structural plastics is "small-scale" chemistry. In comparison to millions of tons of various types of acids and massive production of other chemical products, the 80,000 tons of structural plastics of all types required by the Ministry of the Electronics Industry are seen as an annoying burden. If you consider that this "minor detail" must be further subdivided into individual products, then each separate type becomes even smaller in significance.

At one time the State Committee for Science and Technology put forth the task of preparing a specific composite program for creating modern materials to be used by electronic technicians. Now we must say that this initial step has not been completely carried out. The Ministry of the Chemical Industry is avoiding the examination of programs and is preparing its plans without taking into account its partners' needs. Our direct appeals to chemists often go unanswered or meet with protests of objective difficulties. Further, chemists are helped in this by the "sponsorless" character of the new polymers.

The USSR Gosplan is allocating resources for the creation and development of facilities for production of the new polymers and distributing them throughout the territorial administrations of the USSR Gossnab. As a result, the latter agency refers to the Ministry of the Chemical Industry which, in turn, states that the Gosplan has not provided resources for this purpose. Meanwhile, Gosplan considers structural plastics as belonging to the Gossnab product line. All this prevents the formation of a clear picture of needs, fosters a lack of control in the distribution of materials which are in short supply and slows the process of solving the problem. Considering the significance the new plastics have taken on in modern production, coupled with the fact that they will provide direct savings in terms of metal utilization, it would be appropriate to move them to the fundamental product list in order to concentrate development and distribution resources in one agency--the USSR Gosplan.

Of course, a shift to producing new items is not a simple matter. In discussing this situation the Ministry of the Electronics Industry has reached the conclusion that it can render all possible aid to suppliers. Specifically, a decision has been made to purchase new plastics at higher costs--with electronics enterprises being allocated the means required to accomplish this. The Electronics Industry Ministry is prepared to help adjust production on the old lines, but the situation must move off dead center immediately. If not, we may soon find ourselves behind in the race for technical progress in switching devices.

In order to prevent this, chemists must first of all realize a simple truth: there are no "minor details" when intensifying production. Any minor detail turns into great losses. Therefore we are simply obligated to harmonize the development plans of our branches, down to the last minor detail.

12746
CSO: 1841/191

FUTURE OF CYBERNETICS IN CHEMISTRY

Moscow NEDELYA in Russian No 1, 1-6 Jan 85 p 6

[Article by Academician Viktor Kafarov: "Window on the World of Science"]

[Text] 1. Chemistry is so boundless, that talking about the most important event of the year is approximately the same thing as asking how the weather is on the Pacific Ocean. But it is possible to talk about trends of development. In my view, an important trend of development in modern chemistry, which was especially clearly manifested in 1984, is this ancient science's rapid adoption of an incomparably younger science--cybernetics. Wider and wider play is being given to a completely new division of chemical technology--the cybernetics of chemical-technological processes. It has its own strategy of studying complex chemical processes and productions, which assumes the use of systematic analysis. It has its own method--the method of mathematical modeling of chemical processes. Formerly it was impossible to imagine a chemist without test tubes and boilers, pouring together and decanting something. But soon we will no longer be able to imagine a chemist without a computer above all. It is cybernetic methods which have recently made it possible to carry out mathematical modeling of complex contact-catalytic process of obtaining acetophenone, and remove impurities from ethylene on an industrial scale. Cybernetics has helped chemists find the most intensive process and select new catalysts--in other words, to do what V. I. Lenin called the most important thing--raise labor productivity. And these are not merely laboratory experiments: in 1984 new technology was adopted in Nizhnekamsk and Ufa.

The results of all this work were summed up at the First All-Union Scientific-Technical Conference on Cybernetics in Chemical-Technological Processes, held in 1984.

2. Of course, it is very desirable for this important work to be further developed in 1985. I would like to see chemical experiments become completely automated. This would not only sharply reduce the time spent on them, but also, no less important, make the experiment more reliable and the data obtained more objective. I would like to see chemical engineers more boldly adopt systems of automated design in the practice of their job. Such work is going on. Interesting results have been obtained in a number of institutes. But it would be good for this work to go more rapidly.

3. Not long ago, a glance at 100 years did not confuse anyone, but now you can't peep ahead even 15 years without shyness. I see the chemist of the year 2000, who freely carries on a creative dialogue with a computer. I see new chemical apparatus which is astounding not for its size, but for its unprecedented productivity. I see units which require minimal quantities of energy from the outside--after all, many chemical reactions release heat, and we do not always know how to catch this heat and use it. Finally, I see combines and plants operating in a closed cycle, cybernetically organized, and completely waste-free. So that people walking past them will look at the green grass, bright flowers, blue rivers, and clean skies, and say to each other: "Well, what else could you ask for--that's chemistry! It is purity absolute!..."

12255

CSO: 1841/169

NEW DEVICE FOR CULTURING RUBIES

Moscow MOSKOVSKAYA PRAVDA in Russian 19 Jan 85 p 3

[Unattributed article: "How To Raise Rubies"]

[Text] 15 January, Tuesday--The Moscow Chemical-Technologic Institute imeni D. I. Mendeleev has developed a new device for breeding artificial crystals.

The ruby and the sapphire are good not only in a golden setting. Their prototypes--artificially cultured monocrystals--have turned out to be valuable materials for use in various sectors of the national economy. They possess a number of useful physical-mechanical properties: they are not afraid of high temperatures, pressure, or vacuum. Monocrystals, and they now number more than 200 types, are widely used in electronics: they can be used to create very minute elements of computer technology. The artificial ruby has become the basis for creating pulse-action lasers, which immediately won universal application. These devices have begun to be used for the welding, tempering, and soldering of metal.

The traditional devices for culturing refractory monocrystals were uneconomical and cumbersome--real "Gullivers." They required great outlays of water and electricity. So cultured crystals turned out to be expensive, and greater and greater quantities of them were required. Scientists tried for a long time to simplify the production of artificial crystals and make it less expensive. This was achieved by specialists of the Chemical-Technologic Institute imeni D. I. Mendeleev.

"Our device," explains Candidate of Chemical Sciences M. Provotorov, "fits easily on a work table. It makes it possible to raise crystals of very different forms--in the form of tubes, plates, and angles. The expenditure of energy in this is substantially reduced, and we have completely eliminated the use of water. Cooling is done by air."

The "Hybrid-1," as the instrument is called, is very simple to use. Tiny portions of the stock are fed from a bin--a mixture of powders which are the components of the future crystal. The resulting composition falls into a shaper, where it is melted and acquires the necessary form. Before your eyes, the "ruby" or "sapphire" grows. And the stones which are born under

laboratory conditions are practically no different from those which nature has been forming for centuries. They are also elegant and beautiful in their own way. It is hard to believe that this can be done by artificial means. And apart from aesthetic enjoyment, monocrystals render man vast and invaluable aid.

The new method of culturing monocrystals has already found application in practice. The characteristics of an industrial device have been worked out now, and its adoption will soon begin.

12255

CSO: 1841/ 169

COAL GASIFICATION

IR-SPECTROSCOPIC STUDY OF SAPROPELS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 85 (manuscript received 20 Dec 83) pp 3-8

LISHTVAN, I.I., YEVDOKIMOVA, G.A., YURKEVICH, Ye.A., DROZDOVSKAYA, S. V., YANOCHKINA, L.P. and DUDKA, A.L., Institute of Peat, BSSR Academy of Sciences

[Abstract] Twelve samples of lake sapropels were examined--three each characterized as organic (ash content below 30%), silaceous (high-silica ash), carbonaceous (55-72% carbonate in ash), and mixed. Samples were decalcified with HCl and bitumens extracted with boiling benzene. Humic substances were divided into two fractions, one treated with 0.1 N NaOH at 18-22° C for 20-24 hours and the other with boiling 0.02 N for 1 hour. Infra-red spectra of samples showed the same four types as the initial chemical analysis. In the organic samples, the humic acids present apparently do not have tightly bound amidocarbohydrate complexes. The residue showed a high content of aliphatic hydrocarbon radicals. The relatively large content of easily hydrolyzed substances indicated a significant quantity of polyfunctional acids and compounds with conjugated double bonds. Similar results were found with the silaceous samples. The carbonaceous samples showed high carbonate and carbohydrate levels. In the mixed samples, calcium is apparently tied with carbonate and carboxylic acids. Overall, molecular spectral analysis can be used to type the sapropels without supplementary chemical analysis. Figures 1; references 6 (all Russian). [181-12672]

STUDY OF STRUCTURAL PECULIARITIES OF SAPROPELS BY EPR-SPECTROSCOPY

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 85 (manuscript received 20 Dec 83) pp 9-15

LISHTVAN, I.I., STRIGUTSKIY, V.P., YEVDOKIMOVA, G.A., PROKHOROV, S.G., YANOCHKINA, L.P. and DUDKA, A.L., Institute of Peat, BSSR Academy of Sciences

[Abstract] Thirteen samples of lake sapropels were characterized as organic, silaceous, carbonaceous (high carbonate content), and mixed; several had high iron content. After being decalcified with HCl and having bitumens extracted with boiling benzene, samples were treated with different concentrations of NaOH. Fractions at the various stages of processing were analyzed by electron paramagnetic resonance. All samples showed signals characteristic of trivalent iron and of high-molecular-weight aromatic compounds closely tied to the mineral components of the sapropels. The effect on the spectra of metal ions indicated the aromatic structures were polycondensed by carboxylic groups. Apparently calcium slows oxidative processes, so carbonaceous sapropels showed the lowest oxidative state of manganese and the lowest levels of humic acids. The sensitivity of EPR spectroscopy to the structural peculiarities of the samples indicates the potential usefulness of this method for diagnosis of sapropels. Figures 1; references 16 (Russian).

[181-12672]

UDC 553.983.542.943.5

STUDY OF STRUCTURE OF SHALES OF PUL DEPOSIT BY OZONIZATION METHOD

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 85 (manuscript received 12 Oct 83) pp 30-33

YEGOR'KOV, A.N.; FEKHERVARI, ANTAL; BARLAI, YOZHEF; SHOLTI, GABOR and FOKIN, V.V.; Leningrad Technologic Institute imeni Lensovet; Hungarian Scientific Research Institute of Petroleum and Natural Gas; Hungarian State Geological Institute

[Abstract] These Hungarian shales are unusual for their occurrence in a maar tuff crater. A concentrate was prepared from them by washing with dilute hydrochloric acid and extracting bitumens with a 1:1 acetone-benzene mixture. This was ozonized at 20° C. The products were almost completely soluble in acetic acid. They were divided into water-soluble and water-insoluble fractions and etherified with an ether solution of diazomethane. Chromatographic analysis of the water-soluble fraction showed the nonaromatic character of the shales and indicated a purely sapropelic origin. Dimethyl ethers of relatively long-chain dicarboxylic acids, especially suberic, predominated, while oxalic -- normally formed by

ozonization of aromatic compounds -- showed a low concentration; in addition, some lactonic acids were present. Similarly, in hexane extracts of the relatively large water-insoluble fraction, 1,12-dodecanedicarboxylic acid was the most prominent organic acid; longer chain monocarboxylic normal and ketonic acids were also present. These identified ozonization products indicated the predominantly aliphatic nature of the kerogen. Figures 2; references 8: 2 Hungarian, 5 Russian, 1 Western.
[181-12672]

UDC 542.943:662.732

INFLUENCE OF TEMPERATURE OF PROCESSING OF LIGNITE ON ITS OXIDATION BY
OXYGEN AT 20° C

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 85 (manuscript received 18 Jul 83) pp 95-98

NESHIN, Yu.I., SUKHOV, V.A. and LUKOVNIKOV, A.F., Institute of Fossil Fuels

[Abstract] Lignite samples from the Irsha-Borodinskiy deposit were heated in a vacuum to temperatures of 400-720° C. They were then placed in a microcalorimeter, cooled to room temperature, and reacted with a standard dose of oxygen. The heat output was measured and found to be highest for samples processed at 550° C. At the lower temperatures, heat processing for periods over five minutes had little effect, but at the higher temperatures samples processed for more than five minutes showed a noticeable drop in heat of oxidation. Apparently, thermolysis initially formed compounds which rapidly interacted with oxygen, but continued heating transformed them into more stable compounds. Figures 4; references 2 (Russian).
[181-12672]

UDC 542.943:662.732

OXIDATION OF THERMALLY PROCESSED LIGNITE IN PRESENCE OF FILM-FORMING ADDITIVES

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 1, Jan-Feb 85 (manuscript received 13 Apr 84) pp 99-103

NESHIN, Yu.I., KRAYEV, G.N., SUKHOV, V.A. and LUKOVNIKOV, A.F.,
Institute of Fossil Fuels

[Abstract] Lignite samples from the Irsha-Borodinskiy deposit were heated in a vacuum to 400 and 500° C for 10 minutes and treated with benzene or with 1 to 10 wt % of industrial oils or resins. They were then reacted with a standard dose of oxygen and the heat output measured. Higher concentrations of the film-forming substances noticeably reduced the heat output. Benzene alone significantly reduced the heat of oxidation from samples processed at

500° C, apparently deactivating radicals formed thermolytically at the higher temperature. Other phenolic oxidation inhibitors gave even better results, indicating that oxidation inhibition involves chemical interaction with active radicals as well as the formation of a protective film. Oxidation is further reduced by a secondary heating to 180° C after the application of a resin, allowing both a lower material use and better oxidation inhibition. Figures 3; references 5 (Russian).
[181-12672]

FERTILIZERS

PERSONNEL PROBLEMS AT RUSTAVI CHEMICAL PLANT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 85 p 3

[Unattributed article, date not given: "Rustav Amalgamation 'Azot'"]

[Text] This isn't the first year Rustavi chemical workers are supplying farmers from various regions of the country. Yet at the end of the Five-Year Plan, they are working unsteadily and, for over a month and a half, have owed farm workers 4,500 tons of nitrogen fertilizers and more than 6,000 tons of ammonia.

There are many reasons for this shortfall, but the primary causes seem to be inadequate work with key personnel and a high turnover rate. The amalgamation, headed by General Director G. Gogoladze, has not been provided with trained specialists and workers from even one of the new large plants which have been starting up here almost yearly.

Hence the low level of equipment use, the frequent violation of production regimens, and the increased accident rate. And an accident which was allowed to happen at the end of January at one of the ammonia units has still not been completely corrected. But the Rustavi chemists are well equipped technically and have spare parts and raw material. The production process used here is being successfully used at similar enterprises in the RSFSR, the Ukraine, and Belorussia. Specialists and worker-innovators have come more than once from these enterprises to train their colleagues in advanced labor techniques. But the experience of these leaders is being inculcated slowly.

12809

CSO: 1841/183

EXPLOITATION OF PHOSPHOGYPSUM WASTE

Moscow SEL'SKAYA ZHIZN' in Russian, 18 Jan 85, p 1

[Article "Valuable Wastes: solution required" by Ye. Golovan', Press Center, Ministry of Fertilizers]

[Text] KUKISVUMCHORR: this exotic and somewhat strange sounding name was given by geologists to the first deposit of apatites found in the Khibiny. For a long time the Kola apatites with their richer mineral content were the basic source of raw material for the production of phosphorus fertilizers. But there are no inexhaustible stores in nature. It became necessary to search for new deposits. They, unfortunately, and this includes the large deposits of phosphorites in the mountains of Karatau, contain far less phosphorus and much more impurities, which are difficult and expensive to remove.

At the same time, the fertilizer industry is confronted with the task of increasing the production of phosphorus fertilizers, bringing the output of phosphorus pentoxide up to several millions of tons by 1990. The Research Institute for Fertilizers and Insectofungicides imeni Professor Ya. V. Samoylov [NIUIF]--the leading scientific institution of the industry concerned with the problems of phosphorus-containing fertilizers--is working to solve a number of complex programs. Among them is the program which envisions the creation of the optimal technologies from the standpoint of the utilization of industrial wastes.

Recently NIUIF conducted pilot-scale studies of ammophosphate--a new nitrogen-phosphorus fertilizer produced by reprocessing the "poor" ores of the Karatau basin at the Almalyk Chemical Plant. A process was developed for increasing by 10-15% the output of phosphorus pentoxide and reducing the consumption of scarce sulfuric acid by the same amount. At the same time, the quantity of phosphogypsum in the wastes is lowered.

Here one should keep in mind the fact that 96.9% of the total quantity of pollutants entering the environment as a result of the transformation of the raw material into mineral fertilizers consists of solid wastes, basically phosphogypsum. At first glance it seems harmless in comparison with the wastes that are produced, e.g., in the production of nitrogen fertilizers where expensive and complicated equipment is required to purify the exhaust

gases and the water passes through several purification stages. Phosphogypsum is essentially the same as soil which contains a small proportion of phosphorus and gypsum--substances which are harmless from the environmental standpoint. But even harmless phosphogypsum can do significant damage if allowed to accumulate.

On the scales of production mentioned above, by the end of this millenium, these ghastly white mountains will have doubled in size, to the detriment of agriculture, covering everything around them with dust and dirt.

Unfortunately, science has found no reliable way to utilize phosphogypsum. On the other hand, a multitude of ways of making use of it have been discovered. If various branches of the national economy are brought into the picture, the entire problem of phosphogypsum can be broken down into pieces in the same way as the phosphogypsum itself.

The scientists of NIUIF are engaged in the search for these methods. In Voskresensk where the primary enterprise of the institute is located, one can see an ideal illustration of the solution to the problem. Here, gypsum binder is produced from phosphogypsum and used to enhance the stability of mining excavations in coal mines. A modified phosphogypsum is produced for use in the production of technical rubber articles. Phosphogypsum has also been found to be necessary for oil drillers--they make a packing cement from it for reinforcing the walls of oil wells. Soon the paper industry will also be able to get materials from here for improving production. The list of "specialties" of phosphogypsum is constantly being supplemented by the scientists of NIUIF as they develop new technologies and find new spheres of application in the national economy. However, despite the fact that not only NIUIF is working on this problem (it is also being worked on by the Ministries of the Chemical Industry, Agriculture, Cement Industry, Construction Materials, and has been taken up by the State Committee of the USSR for Science and Technology) only one-fifth of the phosphogypsum produced will be utilized by the national economy in 1985.

Why then are the results of scientific research being adopted so slowly? The problem is that the enterprises of one branch of industry find it quite difficult to transform wastes into income.

At the Gomel' Chemical Plant, which is located within the city boundaries and where the problem of utilizing phosphogypsum is very acute, it has been proposed that a wasteless technology be devised, that the dumping of phosphogypsum be halted, and that reprocessing of the old dumps begin. Here a method is used for granulation of the phosphogypsum for the cement industry, making it possible to obtain 540,000 tons of production per year. The construction of such a facility is also scheduled for other enterprises. But this is a drop in the ocean on the scale of the industry. Perhaps the construction industry will no longer need it? No. It is estimated that the demand for raw gypsum material is already several million tons in the current year alone. However, the plans to satisfy it again involve independent mining of gypsum-bearing rock! This is an obvious paradox. Why increase the production of gypsum from mines, spending huge sums on this, damaging nature,

if the raw material lying dead weight in dumps is not inferior in quality. Consider also the fact that we do not have large reserves of natural gypsum, and ultimately it will become scarce.

Agriculture should also become one of the main consumers of phosphogypsum, using it for gypsum application on alkali soils. Incidentally, the demand for gypsum soil amelioration in this country is tremendous. In the USSR, tens of millions of hectares are alkaline, and 5 to 8 tons of gypsum should be applied to each one of them. However, agriculture has only ordered a few million tons.

The industry's science is also at fault here, since it did not become concerned with implementing technology for drying phosphogypsum at the appropriate time, and gypsum in its usual form gives rise to complexities in storage, transportation and use. To be sure, by the end of the Five-Year Plan, the plants producing dry phosphogypsum will put out ten million tons of it.

NIUIF--a direct participant in the development of new technologies--is now concerned with the problem of increasing the agrochemical effectiveness of applying phosphogypsum in agriculture. The new technology should exclude the dumping and the product itself should be not only a soil improver but also a fertilizer by supplying nitrogen to the soil in addition to phosphorus. In this way phosphogypsum may be excluded from the list of waste products. But it is not a matter for scientists alone.

12822

CSO: 1841/160

PHOSPHORITES IN KYZYLKUM

Tashkent SOVETSKIY UZBEKISTAN in Russian No 11, Nov 84 p 3

[Anonymous article]

[Text] In the Kyzylkum desert rich deposits of phosphorites have been discovered, raw materials necessary for the production of mineral fertilizers. The reserves are estimated in the billions of tons. At the same time the local phosphorite ores have numerous merits making their recovery highly profitable: they are located near the surface in thick strata and are easily enriched.

This discovery by Uzbek geologists has exceptionally great significance, because the four plants, located on the territory of the republic, producing mineral fertilizers are still using phosphorites mined in Kazakhstan and on the distant Kola peninsula. Soon mineral fertilizers will be produced in the republic from local raw materials, which will permit their output to be increased greatly.

12822

CSO: 1841/160

NEW FERTILIZER PLANT IN TURKMENIA

Moscow SEL'SKAYA ZHIZN' in Russian, 2 Feb 85 p 1

[Article by S. Kim, Correspondent of SEL'SKAYA ZHIZN']

[Text] MARY. The Turkmen Nitrogen Fertilizer Plant has put into operation an installation for producing 200,000 tons of liquid ammonia--a basic component of fertilizers. This has allowed the largest chemical enterprise in the republic to switch over completely to the use of local resources, thus making the production of ammonium nitrate less costly, while improving its quality.

With the completion of the construction of the first line, the chemical giant of Turkmenia will produce 765,000 tons of fertilizers, which will fully satisfy the demand for the valuable fertilizer by the agricultural industry of the republic.

12822

CSO: 1841/160

MARK OF QUALITY AWARDED TO FERTILIZER PLANT

Moscow SEL'SKAYA ZHIZN' in Russian, 8 Jan 85 p 1

[Text] Tula. The Yefremovo Plant for the Production of Chemical Fertilizers is only two years old. But youth has not prevented the workers of the plant from achieving their nominal [design] output level ahead of schedule. For example, since the beginning of operations, the plant has produced more than a million tons of sulfuric acid--an important component of fertilizers. The chemists are also successfully increasing the production of liquid combined fertilizers, satisfying the special demands of grain growers.

Both types of production have been awarded the State Mark of Quality.

12822
CSO: 1841/160

CARBAMIDE PRODUCTION AT ODESSA PLANT

Moscow SEL'SKAYA ZHIZN' in Russian, 18 Jan 85 p 2

[Article by A. Soldatskiy]

[Text] Odessa. Another building has been added at the waterfront plant, the first installation for the production of carbamide has been put into operation. It was built with the collaboration of Czechoslovakian specialists.

The installation will manufacture 330,000 tons of fertilizers annually. A second identical plant is being built beside it.

12822

CSO: 1841/160

BRIEFS

SUPERPHOSPHATE SHOP OPERATIONAL--Belorechensk (Krasnodar Kray)--In Krasnodar Chemical Plant, a superphosphate acid shop has gone into operation with a capacity of 150,000 tons of production per year. Builders, assemblers, starting repairmen and operators have dealt successfully with the entire volume of work in a short period of time--within 2 years and 4 months. [Text] [Moscow SEL'SKAYA ZHIZH' in Russian 30 Jan 85 p 1] 12255

CSO: 1841/169

INORGANIC COMPOUNDS

UDC 548.73:546.35'655.4'131

EXISTENCE OF HEXACHLOROCERATES (IV) OF ALKALI METALS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1,
Jan 85 (manuscript received 3 Oct 83) pp 7-11

KISELEV, Yu. M., FILATOV, I. Yu., POPOV, A. I., GORYACHENKOV, S. A.,
MARTYNIENKO, L. I. and SPITSYN, V. I., Moscow State University imeni
M. V. Lomonosov

[Abstract] Except for Cs, hexachlorocerates (IV) of alkali metals (M_2CeCl_6) are unknown. The goal of this study was to verify a conclusion reached by Brandt that it is impossible to obtain such compounds. A modified reaction $2M'X + "H_2CeCl_2" \rightarrow 2HX + M'_2CeCl_6$, where $M' = Rb$ and $X = Cl$ or NO_3 was used in this attempt. Results of x-ray phase analysis and low temperature differential thermal analysis showed that an unstable rubidium hexachloroerate (IV) was formed at low temperature but hydrolyzed easily to Ce (III) derivatives. Even at -20° the product was unstable, the reason for this instability not being readily clear. Hexachlorocerates (IV) of Li, Na and K could not be obtained under the reaction conditions studied. Figures 2; references 11: 8 Russian, 3 Western.
[172-7813]

UDC 539.293:546.681'19:532.739.2

MUTUAL SOLUBILITY AND DONOR-ACCEPTOR INTERACTION OF SELENIUM AND CADMIUM
IN GALLIUM ARSENIDE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85
(manuscript received 29 Mar 83) pp 32-36

GLAZOV, V. M., PAVLOVA, L. M. and PEREDERIY, L. I., Moscow Institute of
Electronic Technology

[Abstract] Mutual solubility of cadmium (acceptor) and selenium (donor) in gallium arsenide was studied at different temperatures by determination of microhardness and by analysis of microstructures. Maximum solubility of CdSe

In GaAs does not exceed 1.5%. The monovariant equilibrium lines determining the existence of ternary solid solutions are complex. A maximum was noted on the solubility isotherms corresponding to a 1:1 concentration of components associated with a donor-acceptor interaction in solid state. It was noted that in the system GaAs-Cd-Se, the solubility of donor in presence of the acceptor increased substantially, showing the effect of donor-acceptor interaction and mutual solubility of these elements in GaAs. An equation was developed for the determination of the isotherm of mutual solubility of donors and acceptors in semiconductors; experimentally determined values showed good correspondence with theoretically calculated data. Figures 2; references 12 (Russian).
[175-7813]

UDC 541.11

THERMOMECHANICAL STUDY OF LAYERED GRAPHITE COMPOUNDS WITH CoCl_2

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 59, No 1, Jan 85
(manuscript received 18 Apr 83) pp 45-48

BULGAK, I. A., SKOROPANOV, A. S., VECHER, A. A., NOVIKOV, Yu. N. and VOL'PIN, M. Ye., Scientific Research Institute of Physical-Chemical Problems, Belorussian State University imeni V. I. Lenin, Minsk; Institute of Hetero-organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The goal of this work was to perform a thermomechanical study of layered graphite compounds (LGC) $\text{C}_{6.97}\text{CoCl}_2$ (I degree, 60.8% CoCl_2) and $\text{C}_{16.8}\text{CoCl}_2$ (II degree, 39.2% CoCl_2) as well as the anhydrous CoCl_2 . It was shown that thermal expansion of pressed cylindrical polycrystalline samples was characterized by greater elongation along the axis than corresponding mixtures of graphite with CoCl_2 . It depended on the "prehistory" of LGC and on its salt content. The reasons for this behavior need further studies. The anisotropy during thermal expansion in axial and radial directions is explained by the orientation of I and II crystals under the action of solid phase pressure during preparation of the specimens for dilatometric analysis. The roentgenograms of LGC samples after 4 cycles of thermobaric treatment differed from the original ones; by means of electron microscopy, new phases with octahedral form were noticed. Figures 2; references 11: 6 Russian, 5 Western.
[175-7813]

STUDY OF STRUCTURAL FEATURES OF ALUMINUM HYDROXIDE PRODUCED AT DIFFERENT PLANTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85
(manuscript received 20 Sep 82) pp 29-33

KORONTSEVICH, A.Yu., MOROZ, E.M., VOROB'YEV, V.N. and AGZAMKHODZHAYEVA, D.R.

[Abstract] Aluminum hydroxide, produced in multi-ton quantities, is used to produce metallic aluminum, ceramics, adsorbents and catalysts. Since each plant producing it uses a different method, its properties such as activity, selectivity and mechanical strength are not uniform. In the present work, X-ray analysis and thermography were used to study the structural features and phase composition of aluminum hydroxide samples used for catalyst production from four major suppliers. The product is a mixture of an amorphous phase, pseudobemite and bayerite. That produced at the Dneprdzerzhinsk and Ryazan plants consists of pseudobemite crystals of 25-30 Å particle size with traces of bayerite, while that from Omsk is 35 Å pseudobemite and amorphous phase. Aluminum hydroxide produced at Angarsk is 65-75 Å pseudobemite with traces of bayerite. Phase composition and degree of crystallinity depend heavily on the storage and transport conditions. Prolonged storage at temperatures below 0° results in bayerite development. Figures 2; references 7: 6 Russian, 1 Western.
[176-12765]

UDC 543.05:667.622

CONCERNING CHANGES IN LIGHT ABSORPTION OF HYDRATED TITANIUM DIOXIDE DURING HEAT TREATMENT

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85 (manuscript received 11 Nov 83) pp 33-36

GUSEV, V.B., KLESHCHEV, D. G. and KALINICHENKO, I.I., Chel'yabinsk Branch, Scientific-Research and Design Institute of Inorganic Pigments and Ship's Coatings; Urals Polytechnic Institute imeni S.M. Kirov

[Abstract] Heat treatment of hydrated titanium dioxide is a basic step in the synthesis of finely divided titanium dioxide. It has been confirmed that both the coefficient of light absorption (K) and the size of the crystallites formed during heat treatment at 20-1000° do not change monotonically, and that K reaches extreme values at 150°, 600° and 900°. A study of this anomaly and the effects of some modifiers used industrially on the optical properties of titanium dioxide show that K changes symbatically between 20° and 800° and antisymbatically between 800° and 900°. This is apparently due to the appearance of active sites on the surface. Modifiers, such as calcium, magnesium or aluminum sulfates, lower the intensity of light absorption

and the concentration of surface defects between 20° and 800° heat treatment. Figures 3; references 8: 7 Russian, 1 Western.
[176-12765]

UDC 546.819+681.2

SOME PHYSICAL PROPERTIES OF $\text{In}_{1-x}\text{Ge}_x\text{Se}$ SYSTEM

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 100-103

ABDULLAYEV, G.B., ALIDZHANOV, M.A. and DOVLATOV, K., Azerbaijan Agricultural Institute, Kirovabad

[Abstract] A phase diagram was constructed for that part of system InSe-GeSe that is in the vicinity of InSe. It was demonstrated that the solubility of GeSe in InSe is 11 mole %. Alloys of $\text{In}_{1-x}\text{Ge}_x\text{Se}$ in the region of solid solutions are p-type semiconductors. Slight displacements of indium with germanium have a marked effect on the electrophysical parameters. Figures 3; references 5: 3 Russian, 2 Western.
[162-12765]

UDC 546.681.23.14

STUDY OF PREPARATION OF GaSe SINGLE CRYSTALS WITH PARTICIPATION OF SnCl_2

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 136-138

ZUL'FUGARLY, DZh. I., GEYDAROV, B.A. and NADZHAFOVA, T.A., Azerbaijan State University imeni S.M. Kirov

[Abstract] While the literature contains much data on the preparation of single crystals of type $\text{A}^{\text{III}}\text{B}^{\text{VI}}$ compounds from the gaseous phase, there is little reference to the preparation of GaSe single crystals with the participation of substances other than bromine or iodine. In the present work single crystals of GaSe_2 were prepared from the gas phase at various temperatures above 600°C with the participation of SnCl_2 . The total yield of single crystals is shown to increase with increasing concentration of transport reagent. GaSe single crystal preparation from the gas phase with participation of chlorine, bromine and iodine takes place by a single mechanism. References 7 (Russian).
[162-12765]

ION EXCHANGE PHENOMENA

UDC 541.13:541.183

ION TRANSFER OF ORTHOPHOSPHORIC ACID THROUGH IONITE MEMBRANES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85
(manuscript received 22 Jul 83) pp 58-60

KOTOV, V.V., YEMEL'YANOV, D. Ye. and KHAR'YANOV, Ye.N., Voronezh Agricultural Institute imeni K.D. Glinki

[Abstract] Anions of acid salts of orthophosphoric acid are especially interesting because they are weak electrolytes with low dissociation constants making them useful in electrodialysis. A study was made of the effect of current density on phosphoric acid ion transfer through an ionite membrane during electrodialysis of 0.1N and equi-normal solutions of sodium dihydro- and hydrophosphates in a 7-chamber dialyser with alternate MK-40 cationite and MA-41 anionite membranes. It was demonstrated that the shift in ion diffusion equilibrium and hydrolysis in the pre-membrane layer of the de-salting section have significant effects on ion transfer through the anionite membrane. The membranes have a high affinity towards the hydrophosphate ion, and the relationship between the hydrophosphate-dihydrophosphate transfer numbers and current density is external and has a maximum in the region of limiting current density. Figures 3; references 4: 1 Russian, 3 Western.
[176-12765]

UDC 541.183.12

COMPOSITION AND ION EXCHANGE PROPERTIES OF INDUSTRIAL GRADE ANTIMONY PENTOXIDE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85
(manuscript received 25 Jul 83) pp 61-64

BELINSKAYA, F.A., PRONINA, I.V. and MILITSINA, E.A., Leningrad State University imeni A.A. Zhdanov

[Abstract] Inorganic ion exchange materials could be used extensively for their high resistance to heat and radiation and their ability to selectively leach out ions from solutions. However, they are not being produced

industrially and it becomes especially important to study the ion exchange properties of those reagents that are being produced. In the present work a physical chemical study was made of 11 samples of "antimony pentoxide (V), Sb_2O_5 ", c.p. grade, TU-6-09-2273-77 and their ion exchange properties determined. The 11 samples were compared with a laboratory sample, and all except the lab sample which was white, had colors ranging from white to yellow. Analysis shows that they contain Sb (V) in quantities of 5.4 ± 0.2 mg-at/g. The samples do have ion exchange properties and they are selective to single charge ions, making them useful for leaching such ions from solutions containing multi-charged ions. Figures 2; references 11: 8 Russian, 3 Western. [176-12765]

UDC 541.64:547.781

COMPLEX FORMATION OF VINYLIMIDAZOLE ANIONITES WITH CHLORIDES OF TRANSITION METALS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85 (manuscript received 1 Feb 84) pp 64-67

SKUSHNIKOVA, A.I., DOMNINA, Ye.S., BAYKALOVA, L.V. and SKVORTSOVA, G.G., Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] Vinylimidazole anionites can be used to leach out metals and for this purpose a study was made of the interaction of these anionites with cobalt, nickel, copper and manganese chlorides. The anionites consisted of copolymers of 1-vinylimidazole, 1-vinylbenzimidazole and 1-vinyl-2-ethylbenzimidazole with divinylbenzene. It was shown that those resins having an imidazole ring in their structure have a high complex-forming capability with metal ions. References 8: 5 Russian, 3 Western. [176-12765]

UDC 661.728.89

SELECTIVE SORPTION OF AMINOACIDS WITH MONOCARBOXYLCELLULOSE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85 (manuscript received 1 Jul 83) pp 138-141

KAPUTSKIY, F.N., YURKSHTOVICH, T.L., BELAYA, A.V. and KOSTEROVA, R.I.

[Abstract] A study was made of the sorption of aminoacids in the isoelectric pH region by a cellulose carboxylic cationite--monocarboxycellulose--and an interpretation of sorption of selectivity based on the observed properties of aminoacids in aqueous solutions is presented. The order of selectivity of aminoacid sorption by monocarboxycellulose was found to correspond to the

aminoacid activity coefficient in the solution. Increasing the distance between amine and carboxyl groups in an aminoacid facilitates increasing the sorption selectivity with monocarboxycellulose. Figures 2; references 13: 9 Russian, 4 Western.
[176-12765]

NITROGEN COMPOUNDS

UDC 547.591.8.07

SYNTHESIS AND PROPERTIES OF DERIVATIVES OF sym-TRIAZINE. 1. ALKOXYLATION OF 2-ALKYL-4,6-BIS(TRICHLOROMETHYL)-sym-TRIAZINES CONTAINING HIGHER ALKYL RADICALS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 84 (manuscript received 17 Oct 83) pp 1674-1677

KELAREV, V.I., AMMAR DIBI AND LUNIN, A. F., Moscow Institute of Petrochemical and Gas Industry imeni I.M. Gubkin

[Abstract] Boiling 2-pentyl- or 2-dodecyl- or 2-heptadecyl-4,6-bis(trichloromethyl)-sym-triazine with a small excess of sodium methylate or ethylate in the corresponding alcohol substituted both trichloromethyl groups with alkoxy groups, but only at temperatures above 40-45° C. Monoalkoxy derivatives could not be formed by this method. Instead, they were formed exclusively by the reaction with an excess of an alcohol in the presence of triethylamine or N-ethylpiperidine or by reacting with an alcohol in dioxane, benzene or dimethylphosphoric acid. Infrared spectroscopy confirmed the presence of both asymmetric and symmetric forms. References 3: 2 Russian, 1 Western.
[166-12672]

UDC 547.491.8.04:543.422.4

SYNTHESIS AND PROPERTIES OF DERIVATIVES OF sym-TRIAZINE. 2. SYNTHESIS OF AMINO-sym-TRIAZINES CONTAINING STERICALLY HINDERED PHENOL RADICALS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 84 (manuscript received 1 Dec 83) pp 1678-1682

MALOVA, O.V., VISHNYAKOVA, T.P., GOLUBEVA, I.A., KELAREV, V.I. and LUNIN, A.F., Moscow Institute of Petrochemical and Gas Industry imeni I.M. Gubkin

[Abstract] The title triazine derivatives were synthesized as potential antioxidants for use in polymeric materials and lubricating oils. Cyanuric chloride was reacted with isobutylamine, N-methyl-N-octadecylamine and

4-n-dodecylaniline at 0° C to produce N-substituted, 2,4-dichloro-6-amino-sym-triazines and at 20° C to produce corresponding 2-chloro-2,4-diamino-sym-triazines in yields of 54-76%. These compounds, in turn, were reacted at 65-70° C with 4-hydroxy-3,5-di-tert-butylaniline to give 51-74% yields of fully substituted triazine derivatives whose compositions were verified by elemental analysis and by infrared, paramagnetic resonance and mass spectroscopy. These derivatives were crystalline solids with melting points in the range 146-307° C. All were soluble in toluene, dimethyl phosphoric acid and dimethyl sulfoxide, as well as acetone, ethanol and dioxane when warmed. They were insoluble in hexane, ether and carbon tetrachloride. References 18: 9 Russian, 9 Western.
[166-12672]

UDC 547.796.1

SYNTHESIS AND PROPERTIES OF 1,5-DIAMINOTETRAZOLE

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 84
(manuscript received 10 Feb 84) pp 1683-1686

GAPONIK, P.N. and KARAVAY, V.P., Scientific Research Institute of Physico-chemical Problems, Belorussian State University imeni V.I. Lenin, Minsk

[Abstract] As a useful intermediate for synthesizing tetrazole-containing compounds, 1,5-diaminotetrazole can be obtained in 60% yield from thiosemicarbazide reacted in the presence of lead monoxide with a slight excess of an equimolar mixture of sodium azide and ammonium chloride in boiling ethanol. The reaction was carried out in dimethylphosphoric acid and the product purified by recrystallization from water. Several reactions of 1,4-diaminotetrazole were examined and compared with 1- and 5-amino-tetrazole; products were identified by elemental analysis and by infrared and paramagnetic spectroscopy. Strong acids gave stable salts in a 1:1 molar ratio. Carbonyl compounds reacted with the 5-amino group to give the corresponding azomethines. Acetylacetone reacted to condense a seven-membered ring on the tetrazole. Formaldehyde also reacted with both amino groups to give a polymer. In boiling acetic anhydride, 1,4-diaminotetrazole formed a triacetyl derivative. It also formed a 1:1 stable crystalline complex with cupric chloride. References 11: 7 Russian, 4 Western.
[166-12672]

UDC 547.752'791.2

NEW METHOD OF CONVERTING 1-ACETYLINDOLINONE-3 and AROMATIC ALDEHYDES
INTO o-AMINOPHENYLKETONES OF v-TRIAZOLE SERIES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 84
(manuscript received 24 Dec 83; in revised form 12 Jul 84) pp 1687-1688

VELEZHEVA, V.S., VAMPILOVA, V.V., MARSHAKOV, Yu.V. and SUVOROV, N.N.,
Moscow Chemico-technologic Institute imeni D.I. Mendeleyev

[Abstract] When warmed in benzene with a catalytic amount of piperidine, several aryl aldehydes (phenyl, p-iso-propylbenzyl, p-nitrobenzyl, 4-pyridyl) reacted easily with 1-acetylinolinone-3 to give the corresponding 2-arylidene derivatives. These, in turn, reacted with sodium azide in a 1:5 mix of dimethyl sulfoxide and acetic acid to give an 87-90% yield of 4-o-acetylaminobenzoyl-5-aryl-triazoles. The acetyl group was easily removed by warming with sodium hydroxide in a water-dioxane solution, producing the corresponding o-aminophenyl ketones. References 5 (all Western). [166-12672]

ORGANOMETALLIC COMPOUNDS

UDC 547.233.07:543.70

SYNTHESIS AND PROPERTIES OF HIGH-PURITY ARSENAZO-III

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 1, Jan 85
(manuscript received 11 Jan 83) pp 145-148

LUK'YANOV, V. F. and NOVAK, Ye. F.

[Abstract] It is noted that recently, significant advances have occurred in synthesis and utilization of various analytical reagents. The present article reports on synthesis and study of the properties of high-purity arsenazo-III, a bisazo-derivative of chromotropic acid. Its use in photometry is outlined for determining its ability to produce complexes with Th, Zr, Hf and UO_2 metal ions. Arsenazo-III was produced by monodiazotization and nitrogen coupling, then isolated and purified. Best results were achieved with an aprotic solvent, tetramethylene sulfon (sulfolan), mixed with methanol and NaOH. The molar absorption coefficients obtained were higher than those reported for earlier studies. Tables 2; references 12: 11 Russian, 1 Western (patents).
[185-12131]

UDC 541.459+541.515+543.422+547.254

USE OF SPIN TRAP METHOD IN ESTABLISHING RADICAL STAGES OF ZINC-, CADMIUM-, AND MERCURY ORGANIC COMPOUNDS REACTIONS WITH SOME PEROXIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 15 Mar 84) pp 80-85

DODONOV, V. A. and GRISHIN, D. F., Gor'ki State University imeni N. I. Lobachevskiy

[Abstract] The spin trap method was used in studies of homolytic reactions of metalorganic compounds (MOC) of the II group with organic and metal-organic peroxides. In a preliminary step, reactivity of spin traps towards zinc, cadmium and mercury compounds was evaluated using phenyl-tert-butyl nitron (I), 2-methyl-2-nitrosopropane (II) and tribromonitrosobenzene

(III) as spin traps. On the basis of EPR spectra, it was concluded that the direction of spin trap with MOC depends on the structure of the nitroso compound. The reactions of above components occurs via a metalorganic compound-peroxide complex which breaks down homolytically forming alkyl radicals. These radicals are then capable of initiating polymerization of vinyl monomers: styrene and methylacrylate. Figure 1; references 17: 7 Russian (1 by Western authors), 10 Western (1 by Russian authors). [174-7813]

ORGANOPHOSPHORUS COMPOUNDS

UDC 542.91:547.1'118

REACTION OF N-CHLOROMETHYLDIETHYLAMINE, N-CHLOROMETHYLBENZAMIDE AND N-CHLOROMETHYLPHthalimide WITH AMIDES OF TRIVALENT PHOSPHORUS ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian, No 1, Jan 85 (manuscript received 10 Oct 83) pp 173-178

IVANOV, B. Ye., KROKHINA, S. S., CHICHKANOVA, T. V. and KOSACHEVA, E. M.,
Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan
Branch, USSR Academy of Sciences

[Abstract] The influence of C-Cl bond polarity of electrophilic reagents was studied in the series: N-chloromethyldiethylamine (I), N-chloromethylbenzamide (II) and N-chloromethylphthalimide (III), as it affected the reactions with amidophosphites, amidophosponites and amidophosphinites. In the above series, the C-Cl bond changes from an ionic (I) type to weakly-polar or even covalent (III). The reactions were carried out in dry argon at 40-110°C. It was shown that with increased polarity of C-Cl, the reactions occurred primarily along the phosphorus. III, whose C-Cl bond is less polar, reacted with hexaethyltriamidophosphite and with diethylamidodiphenylphosphinite along with N and P, yielding corresponding salts of quasiphosponium and trivalent phosphorus acid chlorides. References 13: 6 Russian, 7 Western.
[172-7813]

UDC 542.91:547.1'118

REACTION OF N-CHLOROMETHYLDIETHYLAMINE, N-CHLOROMETHYLBENZAMIDE AND N-CHLOROMETHYLPHthalimide WITH ESTERS OF TRIVALENT PHOSPHORUS THIOACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian, No 1, Jan 85 (manuscript received 10 Oct 83) pp 178-182

IVANOV, B. Ye., KROKHINA, S. S. and CHICHKANOVA, T. V., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] The goal of this work was to investigate reactions of N-chloromethyldiethylamine (I), N-chloromethylbenzamide (II) and N-chloromethylphthalimide (III) with S-butyldiethylthiophosphinite (IV) and S,S-dibutyldiphenyldithiophosphonite (V) analyzing the effect of C-Cl bond polarity of the electrophilic reagent on the course of this reaction. In the above series (I) to (III) the C-Cl bond polarity changes from practically an ionic one (I) to a weakly polar-covalent type (III). It was found that I and IV did not react at all even when heated to 120°. I and V reacted in toluene, xylene, HMPA and without solvent at 100-120°. II and IV reacted already at 20° without a solvent or in hexane yielding diphenyl-(N-benzaminomethylphosphine. III reacted with IV only at 90-110° in toluene, xylene and without solvent yielding a mixture of products. Overall, II and III reacted with IV along the P atom. Reaction of V with III occurred primarily along the P atom and with II along the S atom. With increased polarity of the C-Cl bond the tendency to react along the S bond increased. References 10: 7 Russian, 3 Western. [172-7813]

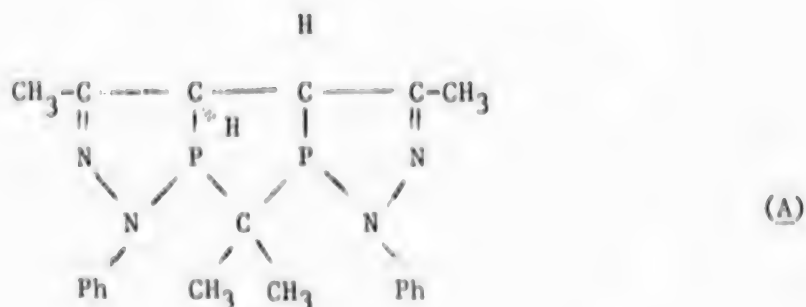
UDC 547.1'118:541.6

REACTION OF 2-PHENYL-5-METHYL-1,2,3-DIAZAPHOSPHOL with 2-DIAZAPROPANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85 (manuscript received 30 Sep 83) pp 3-11

ARBUZOV, B. A., DIANOVA, E. N., GALEYEVA, I. Z., LITVINOV, I. A., STRUCHKOV, Yu. T., CHERNOV, A. N. and IL'YASOV, A. V., Scientific Research Institute of Chemistry imeni A. M. Butlerov, Kazan State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Reaction of 2-phenyl-5-methyl-1,2,3-diazaphosphol with 2-diazapropane occurs rapidly at -80°C with vigorous evolution of nitrogen and formation of a number of products with varying yields related to reaction conditions. One of the isolated products was a tricyclic biphosphoric heterocycle



capable of entering [2+3]-cycloaddition reactions. A reacted with sulfur to form 2,2,6,9-tetramethyl-4,11-diphenyl-4,5,10,11-tetraaza-1,3-diphospho-1,3-dithionotricyclo[6,3,0,0^{3,7}]undeca-5,9-diene. The structure of the tricyclic intermediate was determined by x-ray structural analysis and ¹H, ¹³C and ³¹P NMR spectra. Figures 2; references 15: 11 Russian, 4 Western.
[174-7813]

UDC 547.241

SIMPLE METHOD FOR GENERATING SUBSTITUTED PHOSPHIDE- AND PHOSPHONITE-ANIONS AND SYNTHESIS BASED ON THEM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85 (manuscript received 20 Dec 83) pp 11-26

TSVETKOV, Ye. N., BONDARENKO, N. A., MALAKHOVA, I. G. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A simple synthetic method was developed for generating phosphide- and phosphinite anions based on the reaction of concentrated aqueous base with primary and secondary phosphines or phosphinous acids in DMSO or other bipolar aprotic solvents (dimethylformamide, dimethylacetamide or hexametaprol in presence of potassium carbonate as a water removing agent. Best results were obtained with DMSO. Alkylation of these phosphide and phosphinite anions led to formation of secondary and tertiary phosphines, polyphosphines, substituted phosphines and their oxides. Thus it was shown to be possible to alkylate phosphinous acids in various solvents in presence of concentrated aqueous base and tetrabutylammonium iodide acting as an interphase transfer catalyst. These newly developed methods made it possible to solve two problems encountered in current synthetic methods for secondary and tertiary phosphines: use of absolute solvents and the necessity of using alkali metals, their hydrides, amides or metalorganic compounds to prepare salts of corresponding PH acids. This makes it possible to perform large scale production based on PH acids. References 27: 19 Russian, 8 Western.
[174-7813]

UDC 547.26'118

REACTION OF INCOMPLETE PHOSPHORIC ACID ESTERS WITH α,β -UNSATURATED IMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 15 Aug 83) pp 27-32

SOBANOV, A. A., BAKHTIYAROVA, I. V., BADEYEVA, Ye. K., ZIMIN, M. G. and
PUDOVIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] Reactions of N-alkylsubstituted aldimines of 2-ethyl-2-hexenal, 2-butenal and 3-phenyl-2-propenal with dimethyl-, diethyl-, diisopropylphosphorous and dibutylphosphinous acids were carried out at 20-50°C without any catalysts. These reactions were completed in 1-2 days yielding corresponding 1-aminophosphonates and phosphine oxides. Their structures were supported by IR and NMR ^1H and ^{31}P spectral data. The reactions occurred selectively at the C=N bond showing that unsaturated imines behave like α,β -unsaturated aldehydes. No changes in the product composition were noted when the reactions were carried out in presence of sodium alkoxide. The products obtained were quite unstable, decomposing to the starting products during storage or on heating. Figure 1; references 13: 12 Russian, 1 Western.
[174-7813]

UDC 547.341

SYNTHESIS AND PROPERTIES OF PHOSPHORYLATED ALDOKETENIMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 9 Jan 84) pp 32-39

LEONOV, A. A., KOMAROV, V. Ya., DOGADINA, A. V., IONIN, B. I. and PETROV, A.A.

[Abstract] To evaluate the structural characteristics and reactivity of phosphorylated ketenimines, a number of them was synthesized by reacting chloroacetylene phosphonates with tert-butylamine and adamantylamine. These compounds are stable liquids easily distilled in vacuum. Using a quantum chemical calculation the kinetimine structure was shown to be favored over the tautomeric acetylene phosphonate form. Normally ketenimines are reactive compounds, capable of adding electrophilic and nucleophilic reagents; the product obtained in this study was less reactive, but did react with electrophilic agents such as HCl, H_2O and chlorine in presence of acid catalysts to yield phosphorylated nitriles, acetamides and enamines. The proposed reaction mechanism includes formation of an intermediate enamine structure followed by prototropic isomerization. Figures 2; references 11: 4 Russian, 7 Western.
[174-7813]

UDC 547.341

REACTIVITY OF HYPOPHOSPHITES. 8 COMMUNICATION. SYNTHESIS AND PROPERTIES OF ARYLSUBSTITUTED 1,2-ALKADIENEPHOSPHONOUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85

(manuscript received 2 Feb 84) pp 39-44

BELAKHOV, V. V., YUDELEVICH, V. I., KOMAROV, Ye. V., IONIN, B. I., MYASNIKOVA, L. G. and ROSHCIN, A. A., All Union Scientific Research Technologic Institute of Antibiotics and Enzymes for Medical Application, Leningrad

[Abstract] The goal of this work was to study reactions of hypophosphonous acid with acetylenic alcohols containing alkyl and phenyl substituents. Introduction of the aromatic ring could have an effect on reactivity of the 1,2-alkadiene phosphonites and their biological properties. The reactions occurred with azeotropic removal of water from a mixture of hypophosphorous acid and acetylenic alcohol in benzene. The arylsubstituted allenyl phosphonites obtained are rather strong monobasic acids, although weaker than the alkylsubstituted homologues. The acic strength decreased with increased number of phenyl substituents. The acids react easily with aniline and p-bromoaniline to yield the respective salts, which exhibited low antibacterial activity against both gram-positive and gram-negative bacteria. Figure 1; references 10 (Russian).

[174-7813]

UDC 546.18

REACTION OF λ^3 -AMINOIMINOPHOSPHINES WITH BIS(TRIMETHYLSILYL)MERCURY. P-TRIMETHYLSILYLBIS(AMINO) PHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85

(manuscript received 9 Jan 84) pp 45-50

ROMANENKO, V. D., SHUL'GIN, V. F., SKOPENKO, V. V. and MARKOVSKIY, I. N., Institute of Organic Chemistry UkSSR Academy of Sciences, Kiev

[Abstract] In previous work reaction of tris(trimethylsilyl)aminoiminophosphine with bis(trimethylsilyl)mercury was reported. Continuing this work, the reaction was now extended to alkyl substituted λ^3 -aminoimino- λ -phosphines -- new representatives of aminophosphines containing trimethylsilyl group connected with a phosphorus atom. Formation of P-trimethylsilyl-bis[bis(trimethylsilyl)amino]-phosphine from tris(trimethylsilyl)aminoiminophosphine and bis(trimethylsilyl) mercury occurred upon heating the reagents in hexametafol (HMPA). With increased shielding of the phosphorus atom in aminoiminophosphines, the reaction rate diminished: reaction of N,N'-bis(tert-butyl) aminoiminophosphine with $(\text{Me}_3\text{Si})_2\text{Hg}$ required heating to 80° for 10 hrs to achieve completion. When HMPA was replaced with less polar solvent

(THF, H₂O), the reaction was slowed down. UV irradiation led only to increased side reactions. Hydrolysis of P-trimethylsilylbis(amino)-phosphines (I) with 2-butanol led to bis(amino)phosphines. Acetyl chloride and trimethylsilylketene react with I splitting the P-Si bond without affecting the trivalent phosphorus atom. References 17: 2 Russian, 15 Western (2 by Russian authors).
[174-7813]

UDC 541.63:547.1'118

ANALYSIS OF CONFORMATIONAL COMPOSITION OF TRIMETHYLPHOSPHATE IN AQUEOUS SOLUTIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 23 Dec 83) pp 50-53

YARKOV, A. V. and RAYEVSKIY, O. A., Institute of Physiologically Active Compounds USSR Academy of Sciences, Moscow

[Abstract] At the present time there are practically no data on conformational composition of molecules in aqueous solutions. In the present work, the conformation of trimethylphosphate was studied by the methods of vibrational spectroscopy in water and in the mixture of acetonitrile in water. No specific interaction was noted between the oxygen atoms of the ester groups and hydrogen atoms in water molecules. Experimental results led to the conclusion that changes in conformational equilibrium of trimethylphosphite in water solutions are due to electric properties of the medium and not to hydrogen bonding. Conformational composition of trimethylphosphate in water and in the system (CH₃O)₃PO-H₂O-CH₃CN was determined. Figure 1; references 14: 7 Russian, 7 Western.
[174-7813]

UDC 547.26'118

RELATIVE BASICITY OF NAPHTHYLENEPHOSPHOROUS ACID ESTERS AND AMIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 19 Dec 83) pp 58-65

NITANT'YEV, E. Ye., ASHKINADZE, L. D., VOROPAY, L. M., RUCHKINA, N. G., EPSHTEYN, L. M. and MILLIARESI, Ye. Ye., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] Basicity of esters and amides of 1,8- (I), 2,3- (II), and 1,2-naphthylenephosphorous acids (III) as well as 1,2-phenylenephosphorous acid (IV) was studied. Substitution of an aromatic fragment for an aliphatic one in dioxaphosphorinanes and dioxaphospholanes led to a significant

decrease of basic properties. The basicity of the evaluated esters and amides of naphthylenephosphorous acid decreased in the following order: 1,8 > 2,3 isomers. Amides were much more basic than esters; the 1,2-phenylenephosphorous acid derivatives were about equal in their basic properties as the 2,3-naphthylenephosphonates. The derivatives of 1,8-naphthalindole exhibited the highest tendency to conjugation of O₂X group with the aromatic ring, especially the phosphamide derivatives. Figures 5; references 28: 13 Russian (1 by Western authors), 15 Western.
[174-7813]

UDC 547.26'118

2,3-NAPHTHYLENEPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 19 Dec 83) pp 65-73

VOROPAY, L. M., RUCHKINA, N. G., MILLIARES, Ye. Ye. and NIFANT'YEV, E. Ye.,
Moscow State Pedagogic Institute imeni V. I. Lenin

[Abstract] Cyclophosphorylation of 2,3-naphthalenediol (I) with PCl₃ gave a 60% yield of 2,3-naphthylenechlorophosphite (II) which was hydrolyzed to 2,3-naphthylenephosphite (III) and converted to alkyl(aryl)-2,3-naphthylenephosphite (IV) by treatment with equimolar quantity of alcohol. II upon reaction with secondary amines formed 2,3-naphthyleneamidophosphite (V). Alcoholysis of V gave the desired 2,3-naphthylenephosphites. Various reactions of 2,3-naphthylenephosphites and their NMR ³¹P spectra were compared with 1,2 and 1,8-naphthylenephosphites. The following order of reactivity was noted in respect to oxidation and sulfurization: 1,2->2,3->1,8-naphthylenephosphites. References 6: 5 Russian, 1 Western.
[174-7813]

UDC 546.18

ALKYLATION OF N-DI(TERT-BUTYL)PHOSPHINO-λ³-IMINOPHOSPHINES WITH STERICALLY HINDERED HALOGEN ALKANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 11 Apr 84) pp 219-220

MARKOVSKIY, L. N., ROMANENKO, V. D., KLEBANSKIY, Ye. O., CHERNEGA, A. N., ANTIPIN, M. Yu., STRUCHKOV, Yu. T. and BOLDESKUL, I. Ye., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev; Institute of Hetero-organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] It was established that λ³-aminophosphine may be alkylated on the tricoordinated or dicoordinated phosphorus atom, depending on spacial

structure of the electrophile. Alkylation with methyl iodide leads to quaternization of the tricoordinated phosphorus atom. Iminophosphine reacts with 2-bromopropane and 1-iodoamantane (AdI) to yield N-phosphino-P,P-di(tert-butyl)imidophosphinic acid halogen hydrides. Going from MeI to iso-PrBr and AdI, the reaction goes towards less nucleophilic and less sterically hindered atoms of dicoordinated phosphorus. References 2: 1 Russian, 1 Western.
[174-7813]

UDC 541.124.7 + 547.26'118

ARBUZOV REACTION OF DIALKYL(TRIALKYLSILYL)PHOSPHITES WITH ORTHOCARBOXYLIC ACID ESTERS -- NOVEL HETEROCYCLIC CHAIN PROCESS IN CHEMISTRY OF ORGANO-PHOSPHORIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 13 Feb 84) pp 222-223

NESTEROV, L. V. and ALEKSANDROVA, N. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] As a rule, diethyl(trimethylsilyl)phosphite (I) and triethyl-orthoformate (II) do not react with each other. However, when 0.05 equivalent of an electrophilic initiator is added (HCl, Me₃SiCl, Et₂O·BF₃ or PhCH₂I), an Arbuzov type reaction takes place. A chain mechanism is the most logical one for this reaction. This reaction appears to be the first case in which the Arbuzov reaction occurred by a chain mechanism. Reference 1 (Western).
[174-7813]

UDC 547.341

REACTION OF PHOSPHORUSTRIBROMIDE WITH ALKYLETHINYLSULFIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 18 Jul 84) pp 223-224

SHILOV, S. A., SENDYUREV, M. V. and IONIN, B. I., Leningrad Technologic Institute imeni Lensovet

[Abstract] Reaction of PBr₃ with alkoxyacetylenes occurs in two competing directions (photo-initiated free radical reaction and thermal electrophilic one) leading to a mixture of isomers. Substituting alkylthioderivatives for alkoxy acetylenes makes it possible to separate these processes and to obtain individual products. References 2 (Russian).
[174-7813]

UDC 547.341

PHOTOINITIATED ADDITION OF PHOSPHORUS TRIBROMIDE TO DIMETHYLDIACETYLENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 55, No 1, Jan 85
(manuscript received 18 Jun 84) pp 224-225

SHILOV, S. A., SENDYUREV, M. V., TABER, A. M. and IONIN, B. I., Leningrad
Technologic Institute imeni Lensovet

[Abstract] Photoinitiated reactions of PBr_3 with dimethyldiacetylene gave 2-bromo-3-dibromophosphinehexa-2-en-4-yne in 70% yield, b.p. $113^\circ\text{C}/0.5$ mm Hg, m.p. 36°C . This material could add another mole of PBr_3 upon light exposure yielding 2,5-dibromo-3,4-dibromophosphino-2,4-hexadiene. Without photoinitiation this reaction did not take place. References 1 (Russian). [174-7813]

PETROLEUM PROCESSING TECHNOLOGY

CHEMISTRY CENTER

Moscow IZVESTIYA in Russian, 20 Jan 85 p 2 (Cat. 21)

[Article by L. Vadimov]

[Text] The Institute for Organic Chemistry is twelfth on the list at the Ural Scientific Center of the USSR Academy of Sciences.

It will open in the facilities of the department of the same name of the Academic Institute for Mechanics of Continuous Media and owes its appearance in the Kama River District to the rapid development of petrochemistry in the region. The new institute will aid in the rapid adoption of progressive technologies by the chemical industry of the Urals.

12822

CSO: 1841/160

NORIL'SK TRUCKS POWERED BY GAS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Feb 85 p 2

[Article by V. Sbitnev, SOTSIALISTICHESKAYA INDUSTRIYA correspondent; in Noril'sk, date not specified: "Gas instead of Gasoline"]

[Text] About 100 trucks which are gas fueled at a special station have appeared in Noril'sk. For the first time in the Extreme North, they are using inexpensive gas, which is also ecologically cleaner than gasoline.

Tests have shown that a truck can get 200 km per tank. For conditions in Noril'sk, this is quite acceptable. Therefore, by the end of the year, another 200 gas-powered trucks go into use as soon as they are produced. They will save at least a thousand tons of scarce gasoline.

12809

CSO: 1841/183

KURSK TRUCKS POWERED BY GAS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Feb 85 p 2

[Article by Yu. Petrov; in Kursk, date not specified: "Gas instead of Gasoline"]

[Text] The construction of two truck gas compressor stations has begun in Kursk. Each is designed to fuel 500 trucks per day. Dozens of vehicles in the city have already been converted to gaseous fuel. The "Kurskgaz" Trust has refitted about 60 vehicles, which last year resulted in a savings of 200 tons of gasoline. Truckers are following the example of the gas producers. The second truck transport enterprise already has 15 gas-powered vehicles operating. Startup of gas distribution stations will make it possible to increase the number of vehicles running on inexpensive and ecologically cleaner fuel.

12809

CSO: 1841/183

OIL RECOVERED FROM OLD FIELDS IN AZERBAIJAN

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Feb 85 p 1

[Article from TASS; in Baku, date not specified: "Oil from Oil Fields"]

[Text] Workers of the "Kirovneft'" Oil and Gas Recovery Administration committed themselves to recovering 2,000 tons of oil beyond the plan goal before the opening of the 17th CPSU Congress. These obligations, high for old fields, were confirmed by precise calculation. Additional oil will be obtained here by implementing advanced recovery methods.

In the beginning of last year, the "Kirovneft'" collective had not given a thought to high limits. Despite the shock work of repairmen and drillers, it was impossible to stop the drop in oil output natural for oil fields. The turning point came when representatives of the Azerbaijan Scientific-Research and Design Institute for the Oil Industry responded to the workers' request and proposed new methods for increasing bed oil output.

Usually, water is pumped into the Earth's interior to expell oil from it. Bed complexity and high crude-oil-viscosity oil reduced the method's efficiency this time. Scientists proposed adding special compounds to the water. These compounds, which produce an abundant foam, decrease the oil's viscosity and wash it from the beds. The productivity of each well rose noticeably. The total result was that the Administration's staff overfulfilled the plan for the year by almost 1,500 tons of oil.

"Close ties with science help not only to stabilize, but even to increase oil recovery at old fields," said the general director of the "Azneft'" Amalgamation, A. Dzhaferov. "In this five-year plan we introduced more than 100 types of equipment and reagents developed by Baku scientists. To increase bed oil output, we are using steam pistons and intra-bed combustion. Strengthening ties with science is making it possible to shorten the time it takes new developments to reach the fields."

12809
CSO: 1841/183

UDC 541.127

EXPERIMENTAL METHOD FOR STUDYING REACTIONS TAKING PLACE IN HETERO-PHASE
SYSTEMS UNDER PRESSURE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 12-16

ALIYEV, A.M., BABAYEVA, A.R., KURBANOV, A.G., BABAYEV, R. M. and
SHAKHTAKHTINSKIY, T.N., Institute of Theoretical Problems of Chemical
Engineering, AzSSR Academy of Sciences

[Abstract] A simplified universal set-up was designed to study reaction kinetics in gas-liquid-solid catalyst and gas-liquid-liquid systems at 200 atm pressure and up to 250°C temperatures. The set-up consists of a block of six micro-reactors radially connected on a disc. Various concentrations of reagents and/or catalyst are charged in the reactors and the components vibro-mixed. After a certain period of time, the contents of the reactors are cooled and analyzed. The method gives more accurate experimental data and makes it possible to mechanize and automate kinetic experiments on a mass scale. Figure 1; references 3 (Russian).
[163-12765]

UDC 541.135.52-183.547

STUDY OF ELECTROSYNTHESIS REACTIONS OF CHLORINE DERIVATIVES OF AROMATIC
HYDROCARBONS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 59-63

YUZBEKOV, Yu.A., ATAMOV, M.M., MAKSIMOV, Kh.A. and SAFAROVA, M.I., Institute
of Chloro-Organic Synthesis, AzSSR Academy of Sciences

[Abstract] A method was developed for preparing chlorine derivatives of aromatic hydrocarbons by chlorination of the hydrocarbons with chlorine generated electrochemically from both technical grade and off-gas hydrochloric acid from other processes employing a non-diaphragm glass electrolyser. Figures 3; references 4 (Russian).
[163-12765]

UDC 665(637+662)

SEPARATION OF 400-480°C OIL FRACTION OF SIBERIAN CRUDE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 113-116

RAFIKUL, I., MEKHTIYEV, S.I., SHIKHALIZADE, P.D. and GUSEYNOVA, A.G.,
Azerbaijan Institute of Oil and Chemistry imeni M. Azizbekov

[Abstract] The 400-480°C oil fraction of Siberian crude was separated into individual classes using a combined method of separation by adsorption on silica gel and luminescence. High values for density, index of refraction, and specific dispersion indicate that it is mostly aromatic hydrocarbons.

References 3 (Russian).

[163-12765]

UDC 69-22

STUDY OF PROBLEMS RELATING TO WORK SAFETY AT SUMGAIT ADDITIVE PLANT

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84
pp 136-138

ABUTALYBOVA, S.M., PASHAYEVA, S.Yu. and ASKEROV, K.A., Azerbaijan Polytechnic
Institute imeni Ch. Il'drym

[Abstract] The Sumgait Plant produces additives for mineral oils type IKhP-101 and PFK-U. Two shops produce the above oil additives, one shop produces formaldehyde and a fourth treats waste effluent. A study of the working conditions shows that the alkylation unit at the IKhP-101 shop should be up-graded to eliminate ejection of phenol waste into the atmosphere, and the noise level should be reduced in the vicinity of the vacuum pumps. Steps have been taken to exclude barium oxide dust from the air when it is fed into the mixers at the saponification unit. Rules and regulations pertaining to work safety should be promulgated and programmed training and control should be adopted. References 2 (Russian).

[163-12765]

UDC 547.298.4.057.621.982.86

o-CHLOROTHIOBENZAMIDES AS LUBE OIL ADDITIVES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85
(manuscript received 13 Oct 83) pp 150-153

KULIYEV, A.B., KURBANOV, M.M., MAMEDOV, A . and KULIYEV, F.A., Institute
of Additive Chemistry, AzSSR Academy of Sciences

[Abstract] Results are presented on the synthesis of ten o-chlorothiobenzamides. Tests show that these compounds may be added to DS-11 lube oil to inhibit corrosion and galling. References 2: 1 Russian, 1 Western (in Russian translation).
[176-12765]

PHARMACOLOGY AND TOXICOLOGY

UDC 678.762.2-134-352:615.9

TOXIC-HYGIENIC CHARACTERISTICS OF ETHYLENE-PROPYLENE LATEXES, USED TO
PRODUCE FOOD-GRADE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 85 pp 32-33

STANKEVICH, V. V., IVANOVA, T.P. and RODIONOV, G. A., All-Union Scientific-
Research Institute of Hygiene and Toxicology of Pesticides, Polymers and
Plastics

[Abstract] Double and triple ethylene-propylene copolymers SKEP; SKEP-2
containing unsaturated dienehexene-1; SKEPT-40 with dicyclopentadiene and
SKEPT-E with norbornene have been proposed as heat and ozone resistant
rubbers for use in the food industry. Tests conducted to clarify the possi-
bility of using ethylene-propylene latexes for use in making rubbers to
be in contact with food products show that SKEPT-2 and SKEPT-40 leach out
toxic components into water, and they are not recommended. Rubber SKEPT-E
containing ethylidenenorbornene may be used in quantities not exceeding 50
parts by weight with natural rubber, while SKEP is recommended for broad use
as a heat and ozone resistant rubber for use with food products.

[177-12765]

UDC 615.281:547.863.1].074:541.14

PHOTOCHEMICAL REACTIONS OF DIOXIDINE

Moscow KHIMIKO-FARMATSEVTICKESKIY ZHURNAL in Russian Vol 18, No 12, Dec 84
(manuscript received 11 Mar 84) pp 1493-1499

TETENCHUK, K.P., DVORYANTSEVA, G. G., MUSATOVA, I. S. and YELINA, A.S.,
All-Union Scientific Research Chemico-Pharmaceutical Institute imeni
S. Ordzhonikidze, Moscow; Scientific Research Chemico-Pharmaceutical
Institute, Novokuznetsk

[Abstract] Natural light and monochromatic light of wave length 260 nm were
used for room temperature illumination of water and ethanol solutions of
dioxidine -- 1,4-di-N-oxide 2,3-bis(hydroxymethyl)quinoxaline. This gave

a two-stage photolysis, first to 1-N-oxide, 2-hydroxymethyl-3-oxo-4-hydroquinoxaline and then to 2,3-dioxo-1,4-dihydroquinoxaline [nomenclature in Russian text is obscure]. These compounds were identified by element analysis and mass spectrometry, and by infrared and nuclear magnetic resonance spectroscopy. In relatively dilute concentrations (4.0×10^{-5} to 2.25×10^{-3} M) these stages occur sequentially. Optical density measurements clearly show the first-stage photolysis does not involve any other intermediate compounds. The rate of transformation of dioxidine depended on the intensity of incident light but appeared to be independent of the concentration of the solution. Figures 4; references 13: 4 Russian, 9 Western.

POLYMERS AND POLYMERIZATION

ASSOCIATION FOR DEVELOPING POLYMERS DISAPPOINTING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Feb 85 p 2

[Article by Ye. Leont'yeva, SOTSIALISTICHESKAYA INDUSTRIYA economic columnist: "Polymers and Half-Measures" [Polimery i polumery]]

[Text] Among materials with predetermined properties, an important place belongs to filled polymers. The filler, which may be chalk and clay, mica and fiberglass, cellulose, and also any metal, can change the nature of the plastic in a surprising way, giving it rigidity, electrical conductivity, incombustibility, thermal stability, and a mass of other useful and sometimes unexpected qualities.

In principle, filled polymers are produced by the chemical industry--in many plastic plants there are large divisions or lines for this purpose. But the sector still has no separate enterprises which specialize in the production of these materials. The USSR Gosplan was not even able to name the volume of their output--they are still "dispersed" in the overall line of plastics. Moreover, there is not even a methodology for counting and classifying them.

In the past 5-year period, the USSR Academy of Sciences Institute of Chemical Physics gave rise to a fundamentally new approach to creating filled polymers, making it possible to obtain very different materials with an unexpected set of properties. The novelty consists of the fact that the fillers were mixed in not by mechanical means, in a melt, as is conventionally done in world practice, but by chemical means--at the stage of synthesis. Since the new technology was able to be used in many sectors, the problem of its introduction grew to the level of a major economic task.

How to more effectively bring it to industrial assimilation? Traveling the usual, fairly thorny path, through long searches for organizations which could take an interest in the ideas and bring them to the plant? But practice tells us that in such cases the job can stretch out for long years. The Academy of Sciences came out with the proposal to create a new organization which would work under the scientific leadership of the academic institute. Thus, in 1979, the Norplast Scientific Production Organization came about.

It included the Kuskovskiy Chemical Plant, located on the border of Moscow, and a newly originated special design-technological buro. It was thought

that the ideas of the scientists of the academic institute, working on the same problems, would there pass the stage of technological study, and be tested in plant shops for widespread adoption. In order to do this, the Ministry of Chemical Industry was supposed to remove from the plant a number of production facilities, to use the freed space to house experimental-laboratory installations to obtain filled polymers and equipment for testing.

In addition, Norplast, subordinate to the Ministry of Chemical Industry, was intended to become the head organization and coordinate all problems of developing filled polymers, determine the field of application of these materials and their effectiveness, and study the equipment and evaluate the resources of raw materials in related ministries. As we see, the tasks had an interdepartmental nature, which naturally was happily perceived and gave rise to hopes of eliminating narrow sectorial frameworks.

Five years passed--a time sufficient to agree on what exactly was obtained from this experiment. And it turns out that the hopes were greater than the results. The promising direction in the development of plastics is being implemented very slowly. Since 1980 about 9 million rubles have been spent on scientific-research work in the scientific production association. What sort of returns has this had? Several months ago the association was audited by the USSR Peoples Control Committee, which established that not one development in chemical filling had come out into the industry. Out of 39 stages of the goal-oriented integrated program specially adopted in 1980, only 16 had so far been fulfilled. Meantime, it had been planned to be completed in this year.

The first robin of fundamentally new technology for obtaining filled materials should be kompanor--a rigid plastic which can find application in the mining and pulp and paper industries, for manufacturing parts of machines and looms--the sphere of possible use is very wide. But first the process must be worked out in experimental-industrial production. But at the present, consumers do not have kompanor. Moreover, there is not even any experimental-industrial production.

"The reason is because no funds have been allocated for its creation in the 11th Five-Year Plan," explains V. Kovriga, general director of Norplast.

"The problem is not capital outlays," counters V. Tarbenko, head of the plastics subdepartment of the USSR Gosplan. "The Ministry of Chemical Industry did not even come to us with such proposals. Further, we literally forced the chemists finally to include the creation of an experimental-industrial production in the overall plan of development of the sector for the 12th Five-Year Plan."

"The reasons are much deeper than that," says Dr of Chemical Sciences S. Vol'fson, a scientific associate of the Institute of Chemical Physics, who is responsible for the communication between the scientific production organization and the Academy of Sciences. "Every new undertaking requires a certain risk--maybe something will suddenly fall through? In that case, it is better not to hurry. But then we will be getting away from our main goal--to adopt novel ideas more rapidly. And we are getting away from it...."

In the framework of the integrated program much significance was attached to the start-up of an experimental facility for obtaining perlite-filled polyethylene. It was supposed to be the basic link for adopting new types of heat-insulating materials in construction, but so far it has not even "come to mind."

The facility was erected in Mytishchi, in the Stroyperlit Combine. Territorially, this is not far from Norplast, but the actual distance is immeasurably greater--the combine belongs to a completely different ministry. V. Kovriga, general director of the scientific production association, assesses the situation single-mindedly:

"It's not our problem. Once you undertake something, you have to look after it yourself."

He considers his position unassailable, and meets with hostility any reminder about the functions of the head organization, about the responsibility for adopting the technology of filled polymers in all sectors.

Thus, "his own" experimental-industrial production is not being constructed, and things are not going well with "someone else's" facility. Let's try to answer this question: Why is the union between sectorial and academic sciences on the skids?

The special design-technological buro created in the form of Norplast did not exist very long. It was soon transformed into a scientific-research institute of the first category--a composite all-union scientific research institute. And later everything went along a smoothed path: a sectorial system of accounting and planning came into force, as well as a sectorial system of assessing the effectiveness of science, aimed at problems of "local significance." A customer will come in, "puzzle it over," and pay the money. Among proposals it is always possible to select those which will give a rapid effect.

But what about the academicians' ideas? The special design-technological buro employed primarily engineers. They were concerned with calculations of processes--that is, they carried out their functions as engineers. In a scientific research institute, where people with degrees predominate, essentially no one is concerned about experimental facilities. Thus, the practical implementation of developments in filled polymers were set down to a lower plane.

Norplast and the USSR Academy of Sciences are still formally continuing to work on the same team. Only the associates of the Institute of Chemical Physics are now not very desired guests in the scientific production organization. The program is not being fulfilled--one side lays the blame on the other--and vice versa. But science does not stand still--new projects are being born. But since the earlier ones have not been brought into being, the new ones do not receive a special greeting in Norplast. For example, the academic institute has recently developed the material graphite-filled propylene, which is a good conductor of current and heat. It can be used to make electrostatic precipitators. Frost-stable propylene has appeared. A

material has been born which is filled with magnetic particles by polymerization methods. The "academicians" are demanding rapid transferring of the work to experimental facilities; the chemists are holding it up--production, they say, is all fouled up.

And indeed, it is all fouled up. The Kuskovskiy Chemical Plant, as before, is producing 30 million rubles' worth of goods per year which have no connection with chemically filled polymers. In 5 years, only one production has come out of here, so that a real experimental base for developing processes does not actually exist. But about 20 out of 80 scientific associates of the composite all-union scientific research institute are occupied with developments in the field of chemical filling. The remaining manpower is scattered about on research on a multitude of topics not connected with the basic direction.

In a word, the proposals of academic science are not taking root very well in the chemical scientific production organization. Of course, this must finally be held against the Institute of Chemical Physics, since at Norplast there is a large contingent of scientists working--about 100 people, and the technology of obtaining kompanor has not yet been worked out. Ideas go on the skids even at the stage of working out processes in experimental facilities.

What will tomorrow be like for the association? How will it grow, what questions will it resolve? The opinion of one side--the Ministry of Chemical Industry--is already quite clear--Norplast is not a subdivision of the Academy...the opinion of the other side is explained by Academician N. Yenikolopov.

"We have returned to what we were doing before,--searching for organizations capable of apprehending our ideas. We are returning to the strategy of agreements. This is not the state's approach to the matter. Until we eliminate recent situations in Norplast, I see only one, very hopeful way out--to subordinate the association to the Academy of Sciences, to convert it into a real engineering center for widespread adoption of promising developments in the economy."

The lesson of Norplast is unquestionably important. Life forces us and will keep on forcing us to search out new organizational forms. Without this, scientific-technical progress could not be considered.

12255

CSO: 1841/169

ELECTRIC MOTORS CONSTRUCTED OF POLYMERS

Moscow MOSCOW NEWS in English No 8, 3 Mar 85 p 10

[Article by Alexander Presnyakov, "A polymeric electric motor"]

[Text] When chemists have synthesized current-conducting polymers, an idea to use them in electrical engineering has sprung up then and there.

What has served as a basis for obtaining a new material? The simplest hydrocarbon, acetylene, which is a gaseous substance having high heat conductivity. This makes it possible to widely use it as a fuel in autogenous welding and cutting of metals.

Recently the scientists of the Institute of Chemical Physics of the USSR Academy of Sciences discovered an effect of acetylene polymerization. From a gas state acetylene has been converted into a liquid, and then into a solid substance. Thus, a polyacetylene has been obtained, a new synthetic compound which is said to have a great future in engineering. Today it has served as a basis for creating a number of compounds having an electric conductivity.

At the Institute laboratory a brush-electrode has been developed for feeding current to an electric motor. So far, brushes have been made from graphite. They have worn out quickly, causing sparking and becoming sources of radiointerference. New polyacetylene brushes will serve ten times as long. They possess other advantages as well. Thus, due to high electric conductivity, hardness and a smooth surface they eliminate sparking.

Testing of slip-ring brushes in electric motors of trolleybuses has shown that they serve without wear twelve times as long as ordinary graphite brushes.

How do the scientists imagine the future of the new current-conducting material in making electric motors?

A core of a conductor will be made from a current-conducting polymer, and its external cover from an insulating polymer. A stator magnetic core, now made from a special-grade steel, is next in turn.

CSO: 1841/191

PRODUCTION OF POLYSULFONE PLASTIC

Moscow SEL'SKAYA ZHIZN' in Russian, 8 Jan 85 p 1

[Text] Alma-Ata. The Shevchenko Plastics Plant has begun production of a new polymer material--polysulfone.

The new polymer, which is produced from petroleum, retains its physical-chemical properties both at 100 degrees below zero and when heated up to 200 degrees. In strength, the new material can compete with metal.

Polysulfone will be used as a substitute for plastics and metals and will find application in everyday life and in various branches of industry.

12822

CSO: 1841/160

UDC 678.746+678.073.04

ANTISTATIC LACQUEURS BASED ON OLIGOMERS AND COOLIGOMERS OF ACRYLAMIDISOBUTYLENE SULFONIC ACID

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 11 Oct 83) pp 89-91

NAUMOVA, S. F., MAKSIMOVA, T. P., MAKOVETSKIY, M. I., KONY SHEVA, T. V., PODGORNOVA, V. A., VASILENOK, Yu. I. and LAGUNOVA, V. N., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences

[Abstract] Synthesis and properties of antistatic lacqueurs obtained from oligomers and cooligomer products of acrylamidisobutylene sulfonic (AABS) acid are described. The presence of acrylic and amide functional groups assured excellent film forming ability and adhesion to polymers, while the presence of sulfonic groups was responsible for antistatic properties. Experimental data showed that lacqueurs prepared from AABS acid oligomers and AABS acid-methacrylic acid cooligomers exhibited excellent antistatic properties in a wide range of relative humidities. Figure 1; references 8: 7 Russian, 1 Western.
[139-7813]

UDC 677.494.675.4

PETP MODIFIED WITH MONOETHANOLAMINE AND DI (HYDROXYETHYL)TEREPHTHALIMIDE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 8 Aug 83) pp 92-94

OSIPENKO, I. F., TSVILIK, G. L. and MISHKINA, L. I., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences

[Abstract] The effect of amide bonds in modified polyethyleneterephthalate (PETP) was studied. Fibers were prepared from modified polymers and their thermal and mechanical properties were studied. Analysis of experimental data showed that chemical modification of PETP with monoethanolamine (MEA) and di(hydroxyethyl)terephthalamide (HETA) makes it possible to produce PETP

fibers with improved properties: the elasticity of these fibers increased by 15% upon introduction of MEA and by 46% with addition of HETA, and the strength -- by 10 and 23% respectively. Optimal quantity of the modifier is 1 mole-%. This effect is due to two factors: concentration of -CONH- groups which facilitate formation of intermolecular H-bonds and a disintegrative effect of the modifier on the ordered structure of the polymer.

References 9: 1 Russian, 8 Western.

[139-7813]

UDC 686.49

PROPERTIES OF FUNCTIONAL COPPER PRINTS ON POLYIMIDE FILM AT ELEVATED HUMIDITY AND TEMPERATURE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 21 Jun 84) pp 97-102

SVIRIDOV, V. V., RUKHLYA, V. A. and VOROB'YEVA, T. N., Belorussian State University imeni V. I. Lenin

[Abstract] Accelerated corrosion of copper prints on polyimide film (PF) under conditions of high temperature (40°C) and humidity (93% relative humidity) was studied, as it affected adhesive strength of copper conductors, their electroconductivity and the resistance of support insulation. It was established that adhesive strength of copper conductors over polyimide film is a reversible function of temperature and humidity of the surrounding atmosphere: the extent of the drop in adhesive strength with increasing temperature and humidity depends on the width and thickness of these conductors; it is maximum during the first days, dropping asymptotically. The most significant input into the lowering of adhesion comes from the humidity sorption by the PF surface and diffusion of the moisture along the contact between copper and PF. After the experimental conditions are reversed, the original values are restored. Figures 2; references 9: 6 Russian, 3 Western.

[139-7813]

UDC 541(64+127):539.3

THRESHOLD MECHANICAL PROPERTIES OF FIBERS FROM MODIFIED POLYETHYLENETEREPHTHALATE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 84 (manuscript received 3 May 83) pp 107-109

PROKOPCHUK, N. R., Institute of Physical-Organic Chemistry, BSSR Academy of Sciences

[Abstract] Polyethyleneterephthalate (PETP) has found wide application in recent years, calling for development of new ways of producing strong, yet elastic threads from this polymer for technological application. One of the possible solutions rests on chemical modification of the polymer requiring no substantive alterations in the technology of fiber production. In this paper, the mechanism of strengthening action of various PETP fiber modifiers is discussed in an attempt to predict maximum strength and elastic characteristics of PETP fibers. It is shown that chemical modification of polymer macromolecules could reach a strength level of 1.79 GPa and elastic modulus a level of 26.2 GPa, surpassing the standard indices by about 54%. References 8 (Russian).

[18-7813]

UDC 541.64.678.66

SYNTHESIS AND PROPERTIES OF POLYACYLHYDRAZONES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 1, Jan 85 (manuscript received 25 Jul 83) pp 99-101

GONCHAROVA, L.B., GREKOV, A.P., CHUMIKOVA, G.N. and RUDAKOV, Ye.S., Institute of Chemistry of High Molecular Weight Compounds, UkSSR Academy of Sciences, Kiev

[Abstract] Some new polyacylhydrazones were synthesized from heterocyclic dialdehydes and aromatic and aliphatic acid dihydrazides to obtain heat-resistant and non-flammable polymers. Dihydrazides of adipic, sebacic and isophthalic acids were reacted with 5,5'-diformyl-2,2'-difuryl in hexamethylphosphortriamide. The resulting polyacylhydrazones are yellow-brown or yellow-orange powders with no defined melting points. They are excellent dielectrics having a resistance of 30,000 MOhms. Structure was confirmed by element analysis and IR-spectra. The polyacylhydrazones resist hydrolysis after boiling in water for one hour and in concentrated hydrochloric and sulfuric acids for 30 minutes. Blending 10-15% of these compounds with polyurethanes raised the temperature of initiation of decomposition by 100-150% of the latter without loss in strength, elasticity or hydrolytic resistance. Figure 1; references 5: 1 Russian, 4 Western.

[164-12765]

UDC 678.028:541.127

DIELECTRIC PROPERTIES OF POLYMERIC BUILDING MATERIALS

Baku AZERBAYDZHANSKIY KHMICHESKIY ZHURNAL in Russian No 3, May-Jun 84
pp 90-95

ALIGULIYEV, R.M., MAMEDOV, A.A., KHITEYEVA, D.M., NOVIKOV, Yu.V. and
ZELENEV, Yu. V., Azerbaijan State Medical Institute imeni N. Narimanov

[Abstract] A study was made of the effect of temperature on the electrical properties of plasticized polyvinyl chlorides and high and low density polyethylene. The effects of changes in frequency on the changes in dielectric characteristics of polyethylene were demonstrated, and a correlation was established between the specific conductance and the breakdown voltage of the polymers. The effects of light and heat aging on the electrical and physical properties of the polymers were studied. Figures 5.
[162-12765]

RUBBER AND ELASTOMERS

UDC 678.762.2.023.01.541.11

MASTICATION OF STEREOREGULAR BUTADIENE RUBBERS AT HIGH TEMPERATURES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 85 pp 11-15

KUPERMAN, F. Ye. and TAMARKIN, V. F., Scientific-Research Institute of the Rubber Industry

[Abstract] Butadiene rubbers type SKD have low mechanical degradation owing to the high mobility of their molecular chains. A study was made of the behavior of SKD and some other stereoregular rubbers during mechanical treatment at high temperatures (160-200°C), i.e., when the treatment leads to chemical and thermooxidative changes. Mastication at these temperatures was shown to cause changes in structure and properties, depending on the structure and composition of the rubber, content of stabilizers, storage time and other factors. Structure breakdown ultimately results in gel formation. So-called cobalt and nickel rubbers, as well as oil-filled rubbers, break down quickest, while "cast" rubbers having a high content of 1,2-linkages, are prone to structurization and gel formation. Linear cis-butadiene (type VR-01) and oil-filled rubbers masticate monotonically. Figures 7; references 16: 4 Russian, 12 Western.
[177-12765]

UDC 678.033.3.028.002.2

OVERALL IMPROVEMENT OF RUBBER PROPERTIES BY CHEMICAL MODIFICATION OF GENERAL PURPOSE LATEXES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 85 pp 16-19

POLUEKTOVA, L.Ye., MASAGUTOVA, L.V., SAPROVON, V.A. and LYKIN, A.S., Scientific-Research Institute of Tire Industry

[Abstract] Latex properties can be improved by introducing reactive functional groups into the polymer chain. A study was made of the effects of various type functional groups on the structure and properties of rubber and those factors which result in improved latex mixtures and vulcanizates.

Isoprene, butadiene and butadiene-styrene elastomers were chosen as general purpose latexes to which amide, amino-aromatic, anhydride and mixed ester functional groups were added. Relationships obtained between functional group type and its effect on the properties of the vulcanizate may be used to select those modifiers which will impart the desired properties to general purpose rubbers. Figure 1; references 11: 7 Russian, 4 Western. [177-12765]

UDC 678.033.31.541.183.23:678.048.21

WAYS IN WHICH TIRE RUBBER STABILIZERS ARE CONSUMED

Moscow KAUCHUK I REZINA in Russian No 1, Jan 85 pp 19-23

TOKAREVA, M.Yu., KAVUN, S.M., LYKIN, A.S. and ANDREYEV, L.V., Scientific-Research Institute of Tire Industry

[Abstract] Antioxidants contained in the thin sidewalls of tires are said to be consumed as a result of heat, oxygen and ozone present in air and contact with wet road surfaces. A laboratory scale study of antioxidant consumption in SKI-3 vulcanizate containing various antioxidants made by rotating rubber samples on drum immersed in a bath shows that the major loss is due to chemical reactions of the antioxidant. Evaporation does not exceed 20-30% of the total consumption, and the loss due to washing out is insignificant. Figures 5; references 14: 11 Russian, 3 Western. [177-12765]

URETHANE ELASTOMERS WITHOUT ISOCYANATES

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 11-13

VIRPSHA, Z. and KOVAL'SKIY, K., Polytechnical University, Radom, Poland

[Abstract] Urethane-type polymer films were formed by co-condensation of polyoxyethylene glycol and formaldehyde with 10-50 wt.% dioxymethylurea (in a 50% water solution acidified with perchloric acid to pH 1.9) or with 5-20 wt.% urea (acidified with perchloric acid to pH 1.6 or diluted with water to 40% concentration and acidified with hydrochloric acid to pH 1.9). The polymer formed in 30 min at 363°. Of the first type, films formed with 30 wt.% dioxymethylurea had the lowest density and permeability to water vapor and highest relative elongation prior to rupture. Of the second group, films with 20% urea had the highest elasticity and elongation. Under cyclic loading with a constant force, deformation was reversible in the range 293-383° K; above 403° K deformation increased, reaching a breaking point at 448° K and 69% elongation. Figures 3; references 4: 2 Polish, 2 Western. [147-12672]

EVALUATING INTERACTION OF RUBBER-FILLER COMBINATIONS BY USE OF TENSION-ELONGATION CURVES

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 14-16

SHOOSH, I., Hungarian Rubber Factory "Taurus," Budapest

[Abstract] Vulcanized samples of butadiene-styrene rubber with a variety of commercial carbon fillers were stretched 250%, given a short relaxation period, stretched again, and then allowed to rest for 1-17 hr at 75-121° C before the process was repeated. Based on tension-relaxation curves for these experiments, constants C_1 and C_2 of the Mooney-Rivlin equation were calculated. The values of C_1 varied little and were only slightly above the value for samples without a filler. The values of C_2 were significantly higher for more active fillers and increased linearly with increasing filler concentration. The value of this constant appears to reflect the degree to which the sample departs from ideal Gauss behavior and so can serve as a measure of the interaction between the rubber and the filler. The relation of C_2 to iodine number and to the adsorption of dibutyl phthalate indicates that it is sensitive to changes in the relative surface and degree of structure of the filler and can be useful for determining the effect of fillers on elastomers. Figures 5. [147-12672]

FEATURES OF FORMATION OF ADHESION BOND OF RUBBER WITH BRASS-PLATED METAL CORD IN PRESENCE OF CHLORINE DERIVATIVES OF P-XYLENE

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 17-18

HABERLAND, N., SHMURAK, I.L. and YEVSTRATOV, V. F., Moscow Institute of Fine Chemical Technology imeni M.V. Lomonosov; Scientific Research Institute of Tire Industry

[Abstract] A study of the strength of the bond between brass-coated metal cord (5 X 0.25mm) and vulcanized natural rubber containing 50 wt.% commercial carbon (HAF), 10 wt.% zinc oxide, 1 wt.% fatty acid, 0.75 wt.% N-oxydiethylene-2-benzothiazolylsulfenamide and 2.5 wt.% sulfur, with the addition of 2 wt.% cobalt naphthenate or 1.5 wt.% hexachloro-p-xylene or dichloro-p-xylene. Measurements were made before and after aging 8 hr at 120° C. The xylene derivatives provided a stronger bond, especially after aging, and less sulfided cord surface, apparently due to surface formation of chlorides of copper and zinc. Samples with hexachloro-p-xylene showed increased concentrations of both sulfur and chlorine in the boundary layer to a distance of 10-25 μ m, indicating a more densely interwoven zone supporting stronger bonds with the metal cord. Figures 4; references 1: 1 East German, 5 Russian, 6 Western. [147-12672]

INFLUENCE OF STORAGE OF SULFENAMIDE ACCELERATIONS ON THEIR VULCANIZING ACTIVITY

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 18-20

KISELA, T., BENISKA, Y. and SHTAUDNER, E., Chemical Faculty of Bratislava Technical University, Czechoslovakia

[Abstract] Commercial and modified samples of N-cyclohexyl-2-benzothiazolylsulfenamid were kept up to 61 days in a desiccator over dry silica gel or over water or in open air on aluminum foil. The only significant change was in the commercial sample kept over water -- the content of the basic chemical component dropped 40%. The thermal stability of samples kept over water was also studied in the range 0-600° C. The samples showed three stages of decomposition, two marked by clear exothermal maximums. Length and conditions of storage did not significantly affect the properties of rubber vulcanized with any of the samples. Figures 1; references 3: 2 Czech, 1 Western.

[147-12672]

CONSTRUCTION AND PRODUCTION TECHNOLOGY OF TUBELESS RADIAL TRUCK TIRES, MOUNTED ON DEEP RIMS WITH 15° EDGE ANGLE

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 22-23

DOGNALIK, Z., Scientific Research Institute of Rubber and Plastic Technology, Gottwaldov, Czechoslovakia

[Abstract] The advantages of radial tires with a height-to-width ratio of 0.9 -- series 90 tires -- are presented. Radial tires require a two-stage assembly, but this can be carried out on a single telescoping drum. Wire beads with a non-circular cross-section can improve stability, but care must be taken to insure that they are not warped during production. Three metal belted radial tires designed by the institute are now in production for use on automobiles and buses, but mounting tools and retreading equipment need to be developed.

[147-12672]

BEHAVIOR OF TYPICAL TIRE TREAD RUBBERS UNDER VARIOUS DYNAMIC TESTING REGIMES

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 23-25

VOLINTIRU, T., IVAN, G. and BUGARU, Ye., Scientific Research Institute of Plastic and Rubber Processing, Bucharest, Romania

[Abstract] Specified tire tread samples containing varied proportions of natural and artificial rubbers and of commercial carbon HAF were subjected to dynamic testing with loads up to 10 kN, frequencies of 5-100 Hz and temperatures of -75 to 200° C. While energy loss by a tire depends on a number of factors, the angle of loss was taken as the most indicative single parameter. It was graphed for the samples in terms of the frequency and amplitude of dynamic loading, at various temperatures and for different initial static loads. In all cases, higher temperatures substantially reduced the angle of loss, while increasing the amplitude or frequency lowered it. Increasing the carbon content also increased the angle of loss and specific rubber mixes showed a consistent order from highest to lowest angle of loss, indicating that the rubber composition was the single most important factor affecting dynamic characteristics of a tire. Figures 1; references 7 (Western).
[147-12672]

EVALUATION OF TIME TO FAILURE OF TIRE CORD UNDER STATIC LOADING

Moscow KAUCHUK I REZINA in Russian No 12, Dec 84 pp 25-28

SER, P., BARTA, Z., ODOR, K. and SALAI, P., Hungarian Rubber Factory "Taurus," Budapest

[Abstract] A decrease in tensile strength over time was assumed to be a function of creep. Samples of four types of rubber were suspended in a constant-temperature cabinet at temperatures of 150 to 190° C. An attached timer stopped when the tested cord ruptured. Observed times agreed well with calculated times derived from a logarithmic equation; equation constants were developed for untreated polyester cord and for cord impregnated with rubber compositions typical for tire applications. The adaptation of these equations to evaluating rubber shock absorbers in piping systems was also considered. They also showed a linear relation between the logarithm of time to failure and the reciprocal of temperature. Logarithmic equations can be used to predict the failure time of synthetic fibers subjected to continuous stress below their breaking strength. Figures 3; references 7: 1 Hungarian, 6 Western.
[147-12672]

WATER TREATMENT

WASTE WATERS PURIFIED BY IRRADIATION

Moscow SEL'SKAYA ZHIZN' in Russian, 18 Jan 85, p 2 (Cat. 26)

[Anonymous article]

[Text] Minsk. Tens of tons of very valuable chemical raw material were extracted from waste water in one year by an installation operating in the Grodno "Azot" Nitrogen Complex. And the purified water is now being sent to installations for reutilization.

Such technology was proposed at Byelorussian University where new techniques are being devised for detoxifying waste waters from the paper-pulp and chemical factories. Scientists are highly optimistic about the radiation treatment of sewerage. It has been found that both toxic and organic substances are destroyed by the action of high-speed electrons and gamma radiation, pathogenic microorganisms are killed, and suspended particles settle out more rapidly. The researchers have tested the calculated modes of irradiation in practice. The results have shown that the new method represents no danger to humans. Its costs are quite low--several kopecks per cubic meter of water.

12822

CSO: 1841/160

NEW DEVELOPMENTS IN WATER PURIFICATION

Kiev PRAVDA UKRAINY in Russian 20 Feb 85 p 4

[Article by N. Svichkolap: "Fact and Commentary: How a Solution was Found"]

[Text] The UkSSR Academy of Sciences Colloidal Chemistry and Hydrochemistry Institute in Kiev has developed a composite plan for purifying water containing complex pesticide and toxic chemical mixtures used in agriculture to combat weeds and plant diseases.

Can the behavior of pesticides in water be predicted? To answer this question a group of these substances must be evaluated in terms of their stability in a given medium and a determination must be made as to their inherent capacity to accumulate. Once in a body of water, any toxic chemical is subject to various types of transformation (for example hydrolysis or oxidation). It can be ingested by plankton, algae, and fish, or absorbed by bottom sediments. In other words, in its own way it will affect the future of rivers and lakes. And considering that now many open ponds are being used as sources of drinking water, it is clear just how serious the problem is.

"The purification equipment currently available at chemical facilities may not always be a reliable barrier against these substances," says senior scientific staff consultant, M. A. Shevchenko, doctor of technical sciences.

The complexity of combating toxic chemicals lies in the fact that they belong to the most varied classes of organic compounds. Pesticides can only be inactivated by the use of heat, but this method is very expensive.

All of this spurred our investigations. We used the oxidation process as our base, studying first the chemistry of oxidant interaction with pesticides. Science associates P. N. Taran and P. V. Marchenko devoted special attention to determining the toxicity of intermediate and final products. We were helped in this area by collectives from the Public Health Department of the Kiev Medical Institute and from the laboratories of the All-Union Scientific Research Institute for Pesticide Safety and Toxicology.

At the same time, science associates at our institute have taken up questions of purifying hothouse facility drainage systems whose waste waters can end up in city sewer systems. This has resulted in a design based on the use of ultraviolet light to neutralize waste water.

Today we can speak of yet another success capping years of painstaking work on the part of scientists. For the first time in this country a system for neutralizing complex pesticide mixtures has been developed and is operating successfully at a storage yard for plant protection substances. There are figures available on this: the economic impact of introducing scientific innovations in water purification at Agrichemical Association enterprises is nearly two million rubles annually. This success is also evidenced by a number of aspects which lie beyond economic concerns, such as protecting the environment and safeguarding public health.

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TECHNOLOGY OF TREATING EFFLUENTS FOR ORGANO-MINERAL SUSPENSIONS IN CONCENTRATED AQUEOUS SOLUTIONS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 1, Jan 85
(manuscript received 1 Jun 83) pp 122-126

MATVEYENKO, A.P., VOLKOVA, A.N. and TREKALO, V.Yu., Leningrad Technologic Institute imeni Lensovet

[Abstract] Using the effluent from a beef cattle complex as an example, the possibility of combining the suspended coarse matter separation stage with that of the reaction products of coagulated suspended matter with high molecular weight compounds formed during electrical treatment was studied. A coprecipitation effect of a synthesized colloidal phase with dissolved organic matter during electrical treatment of animal wastes in a two-anode cell was observed. Use of aluminum anodes resulted in a 40-50% decrease in dissolved matter, while iron and copper anodes resulted in 20-30% and 3-30%, respectively, depending on the duration of treatment (1.5-20.0 min.). An experimentally checked method is proposed for treating wastes without preliminary centrifuging of coarse suspended matter.

References 9: 8 Russian, 1 Western.

[176-12765]

WOOD CHEMISTRY

SUPPLY PROBLEMS AT BALAKHINSK PAPER MILL

MOSCOW SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 85 p 3

[Article by Yu. Fabrikov, assistant chief engineer of the Balakhinsk Cellulose-Paper Mill imeni F. E. Dzerzhinskiy; in Gor'kovskaya Oblast, date not specified: "Troubles at the Start"]

[Text] For last year's results, our mill was awarded the Challenge Red Banner by the CPSU Central Committee, the Council of Ministers of the USSR, the All-Union Central Council of Professional Unions, and the Komsomol, and a plaque in our honor was mounted at VDNKh. This victory in socialist competition with related enterprises in the industry was not won easily. Literally the entire collective contributed to the struggle. By joint efforts we produced about 10,000 tons more than our annual assignment of newsprint. More than half of the output came from the group with the Star of Honor. By reducing the weight of a square meter of paper, an economy of 50,000 cubic meters of wood pulp was achieved.

The collective had a difficult task in further reducing consumption of raw materials, electricity, and other resources. This is easy to believe if we look at the socialist obligations for 1985 -- they were published in "SOTSIALISTICHESKAYA INDUSTRIYA" at the end of December. I remember one point: "Reduce the weight of a square meter of newsprint by 4 percent as compared with the plan." This doesn't seem to be large number, but no one in the country, including our mill, had yet achieved such a result. For comparison: we had to cut paper weight by twice as much as we had managed last year.

What different will this 4 percent make? More than 50,000 cubic meters of wood pulp will be saved. The entire mill could operate for two days on the amount of raw material saved. Most important, the country will receive 30 million square meters of newsprint above the plan. The weight of one square meter will be reduced from 49.2 grams to 47. A newspaper produced using Balakhinsk paper will be the lightest in the land.

To attain the assigned amount, the collective began from the first of this year to implement a whole system of organizational and technical measures. Most of these measures involved refining the production process. This was reflected in individual, brigade, and integrated socialist obligations.

For example, fiber separator and Hero of Socialist Labor A. Smirnov was committed to supplying the paper-making machine with only the highest quality pulp. Cellulose digester operator and Hero of Socialist Labor A. Mosyagin ensures production of the intermediate product. The best paper-making machine staff, headed by senior mechanics A. Bol'shakov and P. Orlov, did not let the units stop. The process was carefully monitored by experienced engineers such as A. Loktev, A. Voloshin, and others.

We introduced a series of innovations which helped ensure production of thinner paper. These included improving the wood pulp refining process and changing the process by which chips are concentrated when they are loaded into the digesters. As a result, the mill completely eliminated the need for cellulose from outside. We now produce it at the mill -- with better quality. This is how a square meter of paper "lost weight."

But, unfortunately, the collective's efforts were not supported by subcontractors. The mill has never been in such a difficult position in its entire long history. Problems began at the beginning of this year. Judge for yourselves.

In terms of process, the mill should operate around the clock. At least 4,300 cubic meters of wood pulp are required every 24 hours. It has to be fed almost continuously to the paper-making machine. If there is the smallest problem in supplying raw materials, the complex equipment begins to idle. Then adjusting it for efficient operation requires not an hour or an hour and a half, but a day or two. Raw material suppliers should take all this into account. Nevertheless, in January our wood pulp deliveries from "Kirovlesosnabsbyt" and "Zapyrallesostroynab" were 21,000 cubic meters short. The heads of these organizations, I. Kalyakin and V. Matyushkin, did not respond to our telegrams or phone calls. It was as if delivery schedules and contractual obligations meant nothing to them.

How is our collective going to make up for a shortfall which is their fault? And it's not a small one -- machine downtime amounted to more than 780 hours. As a result, in January alone the mill failed to meet its customers' orders 638,000 tons of paper.

And in February, the situation is even worse because of what the railroads are supplying. Every day, as per a schedule signed by the head of the local division of the Gor'kovsk Railroad, A. Sharadze, we should have received at least 38 full railroad cars. As a rule, we get only half. Moreover, the railcars which do arrive are unsuitable for use. We organized a brigade especially to repair them; it worked round the clock to rehabilitate the cars. In addition, we came up with a method which would make it possible to load 5 extra tons into each car. But the railroad hasn't made a change for the better. We contacted the head of the railroad, A. Basov, who promised to help, but the situation hasn't changed. Since the beginning of the year, the railroads already owe us almost 500 cars.

Today the mill is in a critical situation. We are forced to store about 500 tons of paper, which our overfilled warehouses cannot hold, in shop aisles, near machines, and in corridors, in violation of fire and safety regulations. After such storage, it is barely suitable for its intended purpose. Losses are unavoidable. Part of it can be used as wrapping paper. This means that the state will suffer huge losses, which no one can make up.

Mill workers anxiously ask us, their leaders, "Why struggle to save some 4 percent, which amounts to two grams per square meter, when hundreds of tons of finished product are practically headed for the garbage dump before our eyes?" And what do we tell them?

But we still hope that our subcontractors will adjust the supply of rail-cars and raw materials. Our collective will make every effort to compensate for the shortfall, honorably fulfill its high socialist obligation, and worthily meet the 17th Party Congress.

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LIGHT AMBER ROSIN PROCESS INSTALLED AT LESOSIBIRSK

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 85 p 3

[Article by V. Semonov; in Gor'kovskaya Oblast, date not specified:
"Amber Rosin"]

[Text] The Lesosibirsk Rosin-Extracting Plant has installed a new process line which will be the first in the industry to produce so-called light-amber rosin.

This is a new product for the wood chemistry industry. It is the result of a joint creative effort of plant engineers and scientific associates of the Gor'kovsk Institute for the Wood Chemistry Industry. The new rosin should replace expensive imported resin required for producing synthetic rubber.

It was not easy for plant workers to build and start up the new line while the plant was operating. Now the main difficulties are past. The first 10 tons of the new grade of rosin have been produced and sent to consumers.

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